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## RECENT WORK ON THE PATHOLOGY OF BLACKWATER FEVER: A CRITICAL REVIEW.

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Although during recent years a considerable number of papers dealing with blackwater fever have been published, very few of them are of any scientific value, and our state of ignorance regarding this important disease is almost as great as it was ten to fifteen years ago.

Broadly speaking, recent communications on blackwater fever can be grouped into the four following classes :—

1. Papers of an essentially clinical nature, in which are recorded, sometimes in remarkable detail, the various symptoms and signs observed by the author. Such papers, which have appeared to the reviewer as merely unnecessary, are, in the majority of instances, the efforts of those who have but recently visited the tropics—usually as the result of the War—and whose interest has been aroused by this most impressive disease. Knowing little or nothing of the condition and having no access to literature beyond one or two textbooks, they have not hesitated to commit their observations and impressions to print, failing perhaps to realize they are simply repeating what has been written over and over again during the past twenty years.

2. Papers mainly concerned with the endemicity of the disease. In these an attempt is made to show by statistics the relation of the disease to malaria or to the various kinds of malaria infection, to quinine, or to the length of sojourn in the tropics, to map out its race incidence, and so forth. These papers almost invariably fail to be of value because the information they contain is deficient in one or more essentials. All work on endemicity must be based on a census of the population, and this is practically never forthcoming. How often do we read of statements to the effect that the liability to an attack of blackwater fever is greater in persons infected with malignant tertian parasites than in those infected with simple tertian or quartan parasites, or that blackwater fever is more likely to occur amongst those who have been a certain length of time in the tropics than amongst those who have been a greater or less time. These statements are based on the particular parasites present in so many cases of blackwater

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fever, or on the fact that the greatest number of cases of blackwater fever were found amongst those who had lived in the tropics for a certain length of time. As STEPHENS (1922) has recently pointed out, no conclusions regarding liability to attack can be drawn from data of this sort unless we have the population data as well. That is, before we can state that the liability to an attack of blackwater fever is greater in persons infected with malignant tertian parasites than in those infected with the other malaria parasites, we must know not only the particular parasites present in the blackwater cases, but also the number of persons infected with each of the three varieties of parasites in the region under consideration. For example, if malignant tertian malaria is nine times as frequent as quartan in a certain district, then the observation that malignant tertian parasites were found in 90 per cent. of blackwater cases and quartan parasites in only 10 per cent. obviously does not warrant the conclusion that malignant tertian malaria renders a person more liable to an attack of blackwater fever than does quartan malaria ; but if, on the other hand, the malaria census of a district shows that malignant tertian and quartan are approximately equally common, then an observation that malignant tertian parasites were found in 90 per cent. of blackwater cases and quartan parasites in only 10 per cent. would warrant the conclusion that malignant tertian malaria renders a person more liable to an attack of blackwater fever than does quartan malaria. Similarly, an observation to the effect that 60 per cent. of the cases of blackwater fever in a certain colony occurred amongst persons who had been two years in the colony and only 10 per cent. among those who had been five years in the colony does not warrant the conclusion that one is more liable to malaria during his second year of sojourn in the colony than during his fifth year, unless we have information regarding the length of sojourn of the susceptible population in the colony. If such a census should show that six times as many persons were in their second year of sojourn in the colony as there were in their fifth year, then the liability to blackwater is really the same in the second and fifth years.

3. Papers dealing mainly with the treatment of the disease. Such papers are in the main without any value and the claims made quite unjustifiable. Time and again papers have appeared in which a more or less complicated line of treatment is described in detail, and then it is naïvely recorded that several cases were treated successfully by it. The authors are apparently blissfully ignorant of the fact that about 75 to 80 per cent. of cases recover whatever treatment be adopted, and that in view of this the fact that three or four cases have survived any particular drug or combination of drugs is merely a *post hoc* phenomenon and does not justify the belief that they have survived because of the drugs administered.

4. Papers dealing with the pathology of the disease. This group comprises a relatively small proportion of the total papers, and it is with it that I propose to deal mainly in the present review.

Nearly two years ago A. PLEHN (1920) published a most interesting paper on the genesis of blackwater fever. In the introductory portion of his paper PLEHN states briefly that there is in German scientific circles no longer any doubt but that blackwater fever is merely a complication of malaria : the presence of malaria parasites in the body is essential for the development of blackwater fever. Owing to repeated destruction of parasites during the febrile attacks, the body

becomes super-sensitive to the malaria parasite protein. When this super-sensitiveness has attained to a sufficiently high degree, a further solution of quite a small number of parasites may precipitate the crisis ; but, as a rule, however, this only occurs when numerous parasites are suddenly destroyed. In most cases the decisive cause of the destruction of the parasites is quinine, but sometimes it is some other drug given as a substitute for quinine or merely with a view to combating symptoms, *e.g.*, tuberculin, antipyrin, phenacetin, phenokoll, methylene blue, salvarsan, atophan, and the application of X-rays to the spleen ; in quite rare cases there is no recognizable cause, even the constitutional disturbances due to cold, wet, wounds, or over-exertion, etc., being absent. The sole essential for the production of blackwater fever is an acute dissolution of a certain number of malaria parasites. The condition of super-sensitiveness appears to be transitory and it becomes compensated through antibody formation by the organism.

PLEHN does not in this paper discuss the evidence supporting the view that blackwater fever is of malarial origin, and the subject is outside the scope of this critique, but attention might here be drawn to an admirable article by STEPHENS (1913), in which the question is fully considered.

The main portion of PLEHN's paper deals with the mechanism by which two of the most important symptoms of the disease are produced, viz., haemoglobinuria and jaundice. In conducting this enquiry PLEHN attempts to answer three questions :—

1. Where does the haemolysis take place ?
2. What is the origin of the casts in the renal tubules ?
3. How is the jaundice produced ?

With regard to the first of these questions, PLEHN reaches the conclusion that there is no evidence that haemolysis takes place in the blood-stream, because, firstly, haemoglobinaemia is not, as a rule, present in blackwater fever, PLEHN himself failing to find haemoglobin in the serum even at the time of maximum haemoglobinuria ; secondly, haemolysin is not found in the blood of blackwater fever patients ; and, thirdly, there are no indications of changes in the red blood cells, *e.g.*, shadows, etc., which might be expected if 60–80 per cent. of the red cells were destroyed in the blood-stream within 24 hours.

PLEHN further finds no support for the hypothesis that haemolysis takes place in the organs which are commonly supposed to be concerned with the physiological destruction of erythrocytes, *e.g.*, spleen, liver and bone marrow, the capacity of which in this direction might be supposed to be increased in blackwater fever, especially if directed against erythrocytes of lowered resistance. The blood destruction is too great and too quick to be explained by the chronic pathological changes seen in these organs in old malaria patients. Again, the weight of evidence does not support the view that the blood-forming organs are exhausted as the result of being continually called upon to replace the destruction due to malaria, as experience has shown that chronic blood destruction by poisons has the contrary effect—increasing and not decreasing new cell formation. The resistance of the erythrocytes in blackwater fever to anisotonic NaCl solutions is lessened in only a proportion of cases—sometimes it is increased ; and, furthermore, such changes are specific only to NaCl solutions, and do not necessarily hold for blood poisons such as saponin. Finally, if haemolysis did take place in the organs in question, then the haemoglobin in order to reach the kidneys must pass via the circulation, and, as already remarked, this does not occur.

All these considerations, states PLEHN, allow of scarcely any other possibility than that the haemolysis takes place in the kidneys. After remarking that nothing is known concerning a haemolytic function of the healthy or diseased kidneys, and that, as a general rule, there is no sign of inflammation in the kidneys of blackwater patients, PLEHN passes on to consider the second question, viz., what is the origin of the cylindrical plugs in the renal tubules ? He points out that these consist either of agglomerations of round, structureless, more or less strongly acid-staining (eosin, picric acid) granules, which in the same conglomerate are of about equal size, but which vary in different plugs between the size of a red cell and that of fine detritus ; or they consist of compact, almost homogeneous, cylinders which in parts show fine granulation, the affinity of which for acid dyes is mostly slight. PLEHN considers that these plugs do not arise from the red blood cells, because these are almost invariably absent from the urine of blackwater patients, and because they take up stains to such a varying degree. The most generally accepted view is that they arise from coagulation of a highly albuminous, haemoglobin containing, exudate ; but on this hypothesis it is difficult to explain why some of the plugs are uniformly more or less granular, whilst others, and apparently the oldest, are almost homogeneous. Weigert's fibrin and elastic stain does not show the fine network characteristic of coagulation. In order to solve this question, which, according to PLEHN, is more than twenty years old, PLEHN re-examined his collection of pathological material. He found that certain lines, which appeared to be the walls of capillaries, and in which endothelial nuclei could be clearly distinguished, bordered not only blood-vessels but also renal tubules which had lost their epithelium. Whether the basement membrane was disintegrated or whether it was so closely applied to the capillary wall as to be indistinguishable from it was undecided. The fragments of the epithelial cells are obviously the material from which the plugs are formed, as one can distinguish in the same kidney all stages from more or less loose epithelial masses, some of which still exhibit nuclei and some of which do not, to large granular and very fine granular, almost homogeneous, firm cylinders. This affinity for acid stains is due to saturation with blood-colouring matter ; in the oldest plugs it is usually slight, but sometimes it is as strong as that of the blood-cells themselves. PLEHN points out that these epithelial fragments are often not found in the place where they have undergone degeneration, but further down the tubules in a region where the epithelial wall is complete. It is noteworthy that these plugs are only occasionally seen in the urine, probably because the urine-stream in the affected tubules very soon is held up. The brown finely granular detritus found in the urine is likewise derived from disintegration of epithelial cells and not from the red cells.

If the renal tubules which contain these cylinders are followed backwards towards the glomerulus a point is often reached where a renal tubule appears to communicate directly with a capillary, *i.e.*, at a point where the epithelium has completely disappeared. It is noteworthy that the number of tubules which have lost their epithelium appears small in comparison with the quantity of plugs, but this is due to the fact that the former are easily overlooked.

As indicative of the functional disturbance of the kidneys in blackwater fever, the inability to excrete bilirubin is of the first importance ; even in the most severe icterus bilirubin is not found in the urine, although it can readily be demonstrated in the blood serum. Moreover,

notwithstanding the high albumen content even in conditions of oliguria, the specific gravity of the urine is extraordinarily low—urine of 1,005 and 1,004 is quite usual, and even 1,002 and 1,001 occur. The specific gravity of urine depends mainly in the first place upon its NaCl content, and in the second place upon its urea content. Finally, the functional insufficiency extends under certain circumstances to the excretion of water ; oliguria is common, and complete anuria may occur with retention of all the waste products of metabolism.

From these considerations PLEHN concludes that : (1) owing to the loss of epithelium at various places along the renal tubules, and possibly also of the basal membrane, the relationship between the contents of the blood-vessels and renal tubules becomes abnormal, and under certain circumstances a direct admixture takes place ; and (2) owing to its high degree of hypotonicity the renal secretion in blackwater fever has a haemolytic action, which normal urine has not.

With regard to the third question, viz., the method of production of the jaundice, PLEHN states that up to the present we have adhered to the hypothesis of its purely hepatic origin. Icterus cannot be due to obstruction in the large bile ducts, because the intestinal contents are usually rich in bile. Neither can it be explained on the assumption that a surfeit of free haemoglobin reaches the liver through the general circulation or through the portal system from the spleen, because, as already stated, haemoglobinaemia is usually absent from the general circulation and consequently cannot be produced in the spleen, because the path from the spleen to the kidneys, where it is excreted, is through the general circulation. The kidneys, moreover, where the solution of haemoglobin occurs, drain into the vena cava.

Recently, however, the exclusively hepatic genesis of the icterus has been questioned, and with good reason, since the so-called reticulo-endothelial cells—especially those of the spleen, but also those of the bone-marrow, lymph-glands and elsewhere, possibly even the blood-stream itself—are prominently concerned with the formation of bilirubin (LEPEHNE, 1919).

Probably the haemoglobin which is not directly passed out into the urine escapes back from the kidneys into the blood-stream and is taken up by these cells before it accumulates sufficiently to be recognizable. The reticulo-endothelial cells convert it into bile pigment and throw it back into the circulation, where the bilirubin accumulates, because the kidneys are unable to excrete it, and consequently it is deposited in the tissues, giving rise to icterus.

Perhaps, however, the mechanism is quite different, as we must bear in mind the fact that in many cases of malaria in the Cameroons bile is vomited by the litre without any considerable decrease in the haemoglobin content of the blood.

Sometimes in blackwater fever icterus is only very slight, and this is the rule in the worst cases, where the blood destruction is so great as rapidly to result in death without the development of icterus, and also in very slight cases, where the haemoglobinuria is only observed fortuitously and is not accompanied by other symptoms. The absence of jaundice in both these classes of cases can be explained on the assumption that the haemoglobin is completely excreted by the kidneys, none getting back into the circulation.

Summarizing PLEHN's theory of the pathology of blackwater fever, it appears to be briefly as follows :—

The primary lesion, resulting from a sort of anaphylactic shock in a malaria subject, is profound changes in the renal epithelium, which

here and there becomes dislodged, and disintegrates, sometimes taking the basement membrane with it. These dislodged, degenerate cells (impregnated with haemoglobin) collect in the lumen of the tubules and form the casts.

These histological changes in the kidneys are accompanied by equally profound loss of function, the power of eliminating urea and sodium chloride, and even water, being greatly decreased. The inability of the kidney to excrete bilirubin is especially noteworthy.

As a result of the dislodgment and degeneration of epithelium and basement membrane, communication occurs between the capillaries and tubules, and owing to the absence of urea and salt the urine is hypotonic and lakes the blood. The jaundice is explained on the assumption that some of the haemoglobin escapes back from the renal tubules into the blood-stream, where it is at once taken up by certain reticulo-endothelial cells and converted into bilirubin, which is disgorged into the circulation, and, as the kidneys are unable to secrete it, deposited in the tissues.

This theory is not only ingenious and attractive, but sufficiently plausible to merit serious attention. In subjecting it to critical examination, we must obviously consider the premises on which it is based. It might at once be stated that PLEHN seems to have relied chiefly upon his own observations and on those of certain German workers, and has consistently ignored the work of foreign observers—particularly English and American—to which, with a single exception, no reference is made. Had PLEHN taken the trouble to familiarize himself to a greater extent with the work of others, it is probable that he would have avoided certain of the errors into which he has apparently fallen.

The fundamental premise on which the whole of PLEHN's theory rests is that, as a rule, haemoglobinaemia does not occur in blackwater fever. There is, unfortunately, astonishingly little in the way of precise information on this important question. So long ago, however, as 1901, STEPHENS and CHRISTOPHERS record that they observed haemoglobinaemia in two of their Sierra Leone cases and in another case it was doubtful ; whether they examined for it in the remaining five cases is not stated, and no reference is made to the subject in the protocols of the cases. CHRISTOPHERS and BENTLEY (1908) write as follows :—

"Examination of the blood in blackwater fever has shown without exception the presence of true haemoglobinaemia, demonstrated by the centrifuging of blood received into hypertonic citrate solution ; the serum after clotting has also always shown haemoglobin, provided the haemoglobinuria was still in progress, but in both cases the amount was usually small and more or less masked by the extraordinarily intense yellow coloration of the serum. We have only once seen haemoglobin so great in amount as to give a rosy colour to the serum and its presence is generally only indicated by an orange tint. Owing to this fact it is difficult to estimate with accuracy the amount of haemoglobin present ; but in most cases seen by us it does not seem to have been more than the equivalent of a 1 per cent. solution of normal blood. In the one case in which the serum was rosy red the percentage of haemoglobin was as high as a 3·75 per cent. solution of blood."

BARRATT and YORKE (1909) investigated this subject with extreme care, and made precise estimations of the amount of dissolved haemoglobin in the plasma of seven healthy persons, 21 suffering from malaria and other diseases, and in 17 cases of blackwater at various stages of the disease. In the healthy persons the amount of

haemoglobin dissolved in the plasma varied between 0·1 per cent. and 0·15 per cent.* Among the 21 persons suffering from malaria, dysentery, etc., the amount of dissolved haemoglobin in the plasma ranged between 0·02 per cent. and 0·2 per cent., except in two cases of malaria, where the somewhat higher degree, 0·31 per cent., was observed. Among the 17 cases of blackwater 40 estimations were made. The observations fell into three classes: those made before, after, and during the passage of blackwater. In the first class, which includes only three observations, the percentage of dissolved haemoglobin was 0·3 or less; in the second class, consisting of 19 observations, the percentage of dissolved haemoglobin was in 12 cases raised, lying between 0·3 and 0·95 . ; in the remaining seven observations it lay between the limits met with in health, viz., 0·09 per cent. to 0·25 per cent. With regard to the latter, it must be remarked that although in these observations the first specimen of urine voided after the examination of the blood plasma contained haemoglobin, it does not necessarily follow that the urine which was being excreted at the time of the examination of the blood plasma contained haemoglobin. It is possible, if not probable, that in some cases the haemoglobinuria had already ceased, although, owing to the relatively long intervals at which the patient passed urine, this did not become evident. Barratt and Yorke sum up by stating that "In the observations made in blackwater fever, while the urine in the bladder still contained haemoglobin, an increased amount of dissolved haemoglobin was observed in most but not in all cases."

Arkwright and Lepper (1918) record that in four of the ten cases of blackwater fever examined by them the serum was sufficiently coloured with haemoglobin to give a spectrum in a tube 0·3–0·4 cm. in diameter; citrated plasma was examined in two of these cases and was also found to contain haemoglobin. The remaining six cases were not altogether satisfactory, because in three the serum was examined only a few hours before the haemoglobin ceased, in one during an intermission, in one after the haemoglobin had ceased, whilst the last, which was examined only a few hours after the haemoglobinuria had commenced, was a mild case. Further information is given regarding one of the four positive cases, Arkwright and Lepper stating that in this case both the serum and the plasma were examined on the first and second day of the attack and both were a deep brownish crimson on each occasion. The colour was due to methaemoglobin, probably with some oxyhaemoglobin, and also, in part, to bile pigment.

Dudgeon (1920) found that the blood withdrawn from a vein in a case of blackwater fever may show evidence of haemolysis varying from a deep coloration of the plasma to a faint tinging. He adds that "the evidence of haemoglobinaemia rapidly disappears from the blood, so that this phenomenon may be overlooked unless the examination is made at the correct moment."

There is, hence, considerable evidence to show that haemoglobinaemia in amounts definitely exceeding that found in the blood of normal

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* Barratt and Yorke used wet human red cells as their standard, and when they state that serum, etc., contains a certain percentage of haemoglobin, they mean that there is in it as much haemoglobin as in a solution containing a similar percentage of normal human erythrocytes. Hence, in order to compare Barratt and Yorke's figures with those of other observers who used normal human blood as their standard, it is necessary to multiply Barratt and Yorke's figures by the fraction $\frac{5}{2}$, the erythrocytes constituting about 40 per cent. by volume of normal blood.

persons, or of persons suffering from malaria, dysentery, etc., is present in a considerable number of cases of blackwater fever, and it is highly probable that, as BARRATT and YORKE, and DUDGEON, pointed out, the failure to recognize haemoglobinaemia may in many, if not all, cases be due to the fact that the attack was really over (*i.e.*, passage of haemoglobinuria had ceased) at the time the observation was made, even though the next specimen of urine voided contained haemoglobin. It is obvious that we require more precise information on this important question, and not merely vague statements that haemoglobinaemia was present or absent, but exact quantitative estimations, such as those made by BARRATT and YORKE, which should, so far as is possible, be correlated with records regarding the degree of haemoglobinuria excreted at the time the observation was made. For this purpose the use of a catheter will probably be necessary.

Although information on the point is, up to the present, not so complete as can be desired, there appears to be no justification for PLEHN's assertion that haemoglobinaemia is, as a rule, not present in blackwater fever.

PLEHN's statement that haemolysis occurs in the renal tubules as a result of admixture of blood from the capillaries with hypotonic urine requires very careful examination.

Leaving aside for the moment the precise nature of the renal lesions and their origin, and, admitting for the sake of argument that a certain amount of haemorrhage into the uriniferous tubules does take place, we must enquire whether the available facts justify PLEHN's contention that it is here that the erythrocytes are haemolysed, owing to their contact with hypotonic urine. PLEHN apparently bases his hypothesis mainly on a belief that the specific gravity of the urine in blackwater fever is extraordinarily low (1,005–1,004 or even less), chiefly owing to its deficiency in NaCl and urea ; although he also recognizes as a possible secondary cause the existence of haemolytic substances of the nature referred to by MATKO (1918).

BARRATT and YORKE (1909), who investigated the action of urine on erythrocytes very fully, write as follows :—

" If an emulsion of red blood cells in 0·9 per cent. solution of sodium chloride is added to urine, it is seen that the latter, when the changes in the red cells described below become advanced, gradually turns brown in colour, but no reddish tint is noticeable. Urine does not produce visible laking of red blood cells unless its specific gravity is less than 1,009. Urine of specific gravity 1,002 lakes red blood cells as rapidly as distilled water. Red blood cells in urine whose specific gravity exceeds 1,009 become, on standing, poorer in haemoglobin and assume a darker, somewhat brownish, aspect, but are ultimately decolorized and form a brownish-white precipitate at the bottom of the tube in which the urine is contained. If such urine at any time after adding the red blood cells is centrifugalized and the supernatant fluid examined spectroscopically, it is found that no oxyhaemoglobin bands are at first seen, the red blood cells becoming decolorized without any laking of their haemoglobin. When, however, the red blood cells have lost 75 per cent. or more of their haemoglobin, oxyhaemoglobin bands make their appearance in the urine, which is now brownish in colour. Just as occurs when dissolved haemoglobin is added to urine, a precipitate brown in colour may make its appearance at the end of 24 hours in the mixture of urine and red cells. It is thus seen that in the red cell the haemoglobin is broken up by urine of specific gravity exceeding 1,009 *in situ*, and does not leave the cell until it has become completely converted into brown pigment."

The question now arises : Is PLEHN correct when he states that the urine in blackwater fever is of extraordinary low specific gravity ?

On looking up the point in the various textbooks one finds nothing beyond the general statement that the specific gravity of the urine is rather low, *vide* ZIEMANN in MENSE's Handbuch, CASTELLANI and CHALMERS, etc. On searching through the literature, a few more or less isolated records are found. KRAUS (1904) gives details of a case in which determinations of the specific gravity were made in eight specimens of urine passed during the first two days of the illness ; the figures varied between 1,034 and 1,016 ; determinations of five other specimens made during the third and fourth days gave results varying between 1,012 and 1,006.

CHRISTOPHERS and BENTLEY (1908) examined the specific gravity of the urine passed by one of their cases during the first three days of the illness and found that it varied between 1,017 and 1,020. CHRISTOPHERS and BENTLEY then add that if the urine were hypotonic, any haemorrhage into the urinary passages could give rise to a condition resembling haemoglobinuria—a theory apparently advanced by PELLERIN as long ago as 1865 and 1876. With a view to examining the question, CHRISTOPHERS and BENTLEY estimated the haemosozic value of the urine in a number of their cases and found that even when haemoglobinuria is present it is far above that at which red corpuscles are haemolysed, and consequently that the urine could not on account of its osmotic effect dissolve red cells.

BREM (1911) gives information regarding the specific gravity of the urine in one of his cases. Eight determinations were made during and after the attack over a period of four days ; the readings obtained varied from 1,033 to 1,022.

DEADERICK (1910) states that the average of a large number of urine analyses gave a specific gravity of 1,015. PARSONS and FORBES (1919) give information regarding three mild cases of blackwater fever. The specific gravity of the urine in the first case varied from 1,023–1,015, in the second from 1,030–1,010, and in the third from 1,020–1,010.

By far the most complete records on the subject are, however, those of BARRATT and YORKE (1909), who examined the specific gravity of almost every specimen of urine passed by the cases which came under their observation. Critical examination of their records show that there is no justification for the statement that the specific gravity of blackwater urine is extraordinarily low, or, in fact, lower than normal. The specific gravity varied considerably in different specimens of urine from the same case ; very few observations of 1,009 or less are recorded, and these low figures are in no way related to the presence in the urine of haemoglobin. This fact is particularly well illustrated by Case 10 of BARRATT and YORKE's series, in which the specific gravity was determined of almost every specimen of urine passed by the patient over a period of 14 days, during which time the patient had, in addition to the initial attack of haemoglobinuria, which lasted three days, 11 distinct relapses, between each of which the urine was of normal colour and appearance. The 85 determinations made on this case show that, although the specific gravity varied between 1,024 and 1,002, only six of the readings were below 1,010, and these low readings did not correspond to the haemoglobinuria attacks, but, on the contrary, were all made during the interval periods.

There appears then no justification for the general statement that the specific gravity of the urine in blackwater fever is abnormally low. It varies considerably, just as does that of the urine of normal persons, depending on a number of factors, one of the most important of which is the quantity of fluid ingested.

Another fact which tells against PLEHN's theory of the haemolytic action of the urine is that it is by no means uncommon to find unlaked erythrocytes in scanty numbers in the urine of blackwater cases. KRAUSS (1904) records that red cells were present generally in small numbers in seven, or possibly nine, of his 17 cases; PARSONS and FORBES (1919) found them in two of their three cases, and DEADERICK in five of 34 cases. BARRATT and YORKE (1909) record that red blood cells were encountered during the haemoglobinuria of blackwater fever in 10 of the 20 attacks investigated, they were usually found in small numbers only; in three cases red cells were not found at first, but as haemoglobinuria was passing off they made their appearance. DUDGEON (1920) writes that red cells which are present in relatively small numbers rapidly disappear from the urine in blackwater fever as the acute stages of the disease subside, but by accurate examinations of centrifuged samples of urine, red cells are found to occur more frequently in the acute stages of the disease than is generally believed and taught. ARKWRIGHT and LEPPER (1918) state that red blood corpuscles were usually absent from the urine, but a few were found in two of their cases.

Finally, as militating against PLEHN's theory that haemolysis takes place in the renal tubules, reference should be made to the fact that the amount of haemoglobin passed out in the urine in blackwater fever is very small compared with the destruction of blood which takes place. BARRATT and YORKE (1909) determined in 10 of their cases the total amount of haemoglobin passed into the urine and found that it varied between 1·5 gm. and 75 gm. of wet red cells; when these amounts are considered with the haemocrit readings of the blood of the various cases, it will be seen that they represent a comparatively small fraction of the total loss of blood. ARKWRIGHT and LEPPER (1918) found that in one of their cases the total haemoglobin lost in the urine was equivalent to 11 oz. of normal blood, and remark that a loss of this order does not seem nearly sufficient to account for the high degree of anaemia produced by the disease.

This fact, while negativing PLEHN's theory, is quite in harmony with the theory that the haemoglobinuria is dependent on haemoglobinaemia, as it has been shown experimentally by YORKE and NAUSS (1911) that only one-fifth or less of the haemoglobin injected intravenously in rabbits is excreted by the kidneys. The following year a similar result was obtained by PEARCE, AUSTEN, and EISENBERG (1912), who found that after rapid injection into dogs of more than 0·012 gm. per kilo per minute of haemoglobin, 16 to 36 per cent. of the total amount, if this equals 0·25 gm. per kilo, is eliminated in the urine; whereas if the injection of not more than 0·35 gm. per kilo is made slowly (less than 0·01 gm. per kilo per minute), the amount eliminated in the urine is only 2·33 to 9·5 per cent. of the total injected.

The facts available, therefore, do not support PLEHN's theory that the haemoglobinuria results from the laking of blood which escapes into the renal tubules; the specific gravity of blackwater urine is not, as PLEHN asserts, abnormally low during an attack, unlaked red cells are frequently found in small numbers in blackwater urine, and, finally, the amount of haemoglobin found in the urine represents only a small fraction of the total haemolysis which occurs, as judged by the lowering of the haemocrit reading or red cell count.

Let us now consider PLEHN's hypothesis that, as a primary result of the blackwater toxaemia, or shock, the epithelial cells lining the

renal tubules are profoundly affected, that they degenerate and become dislodged, and finally disintegrate, giving rise to the material from which the plugs are formed; and, furthermore, that the functional disturbances of the kidneys (oliguria, anuria, etc.) are the direct result of these changes in the epithelium.

This view is directly opposed to that expressed by WERNER (1907) and by BARRATT and YORKE (1909), and by many more recent authors, who found that the granular plugs are derived from haemoglobin, that there is no marked degeneration and disintegration of the epithelium, that dislodgment of the epithelium is a secondary matter, and that the functional disturbances are the result of mechanical obstruction of the tubules by the plugs.

In view of PLEHN's statements, the subject has quite recently been reinvestigated by SALVIOLI (1922), who, as the result of microscopic examination of the kidneys of 13 cases of blackwater fever, in the course of which he employed, in addition to the ordinary methods, that devised by MILLER (1911) for elective staining of haemoglobin, finds himself unable to confirm PLEHN's observations. Pronounced degenerative changes in the epithelial cells were observed in only two cases, and in those the excretion of haemoglobin was insignificant. The epithelial cells in the proximal portion of the uriniferous tubules were unchanged in 11 cases, the loss of epithelium was mechanical, due to friction of the plugs, and the dislodged cells were normal. Blood was found only in the blood-vessels and the corpuscles were normal; traces of blood destruction were not found. The most important finding was the filling of the tubules with granular, or flocculent, masses and widening of the lumen, and here and there in the distal portion of the tubules, dislodgment of the epithelial cells and thick coagulation masses. The majority of the preparations showed that the masses found in the distal part of the tubules originated either out of haemoglobin-impregnated substances or out of coagulation masses mixed with drops of pure haemoglobin.

The experimental work recorded by the reviewer in 1911(*a*) affords strong support to the view that the epithelial changes in the kidneys of blackwater fever patients are secondary to the passage through them of haemoglobin and not, as PLEHN considers, precursors of the haemoglobinuria. By introducing into the circulation isotonic solutions of haemoglobin prepared from the animals' own erythrocytes, the reviewer succeeded in producing in rabbits renal changes identical with those found by WERNER, and by BARRATT and YORKE, in the kidneys of blackwater fever patients, and, furthermore, suppression of urine and death from uraemia. He summarized this observation as follows :—

"The immediate result of such injections is a diuresis, dependent upon the action of the sodium chloride solution used for dissolving the haemoglobin. At the same time the renal epithelium commences to excrete haemoglobin into the tubules. At first this is quickly carried away by the rapid secretion of watery urine from the glomeruli. The result is a considerable flow of clear urine containing haemoglobin in solution. As the diuresis subsides, the haemoglobin, or a closely related derivative, becomes deposited to a certain extent in the tubules. At this stage the urine is less in amount and contains a quantity of solid material, consisting chiefly of granular casts and débris. Still later, especially when the degree of haemoglobinaemia is high, epithelial cells are shed from the lining membrane of the renal tubules. This is probably dependent upon one or both of the following factors. In the first place it is possible that the excretion of large quantities of a foreign substance like haemoglobin may

be attended by injurious effects upon the renal epithelium. In the second place the presence of casts in the lumen of the tubules would tend to damage the lining epithelium mechanically, either by friction as the plug was forced down the tubules owing to the *vis a tergo* of the glomerular secretion, or by causing a complete or partial block of the tubule, and, as a result, dilatation of that portion above the plug, and, consequently, separation of the epithelium from the basement membrane.

"This stage represents the commencement of the development of suppression of urine. Gradually, as haemoglobin continues to be excreted by the renal epithelium more and more tubules become occluded. The situation in which complete blocking of the lumen first occurs appears to be, as a rule, the narrow tubules of Henle. Coincidently, with the plugging of the tubules there is a marked diminution in the amount of urine voided, and also of the haemoglobin it contains. The condition steadily progresses, until, finally, complete anuria results. After cessation of the flow of urine has lasted for a certain time, a gradual re-establishment of urinary secretion occurs. The urine is loaded with albumen, and is exceedingly turbid. On centrifugalization a large deposit, sometimes equalling as much as one-fourth of the volume of urine, is thrown down. This deposit consists of granular casts, epithelial casts, granular débris and degenerated epithelial cells. Urine of this nature continues to be passed until the animal's death. During the period of total or partial anuria marked changes occur in the kidney. Owing to the secretion of the glomeruli those portions of the tubules above the plugs become enormously distended with fluid. As a result, the epithelium lining these portions becomes extremely thin, and in places entirely disappears. The dilated tubules press upon adjacent tubules, so that on microscopic examination the latter appear of small size, and their lumina are completely obliterated.

"After a time, owing to gradual disintegration of the casts plugging the tubes, the urine commences to escape into the ureter once more.

"The serum proteins and red blood cells pass through the damaged epithelium and those portions of the tubules devoid of epithelial cells, with the result that the urine is loaded with albumen. Although the casts may be to a great extent washed away in the course of the next few days, yet the renal tubules remain dilated and the serum proteins continue to escape into the urine until the animal's death, which in these cases is probably due to uraemia."

In a later paper (1911(*b*) ) the reviewer showed that haemoglobin is secreted by the epithelial cells lining the tubules and not by Bowman's capsules.

If the red-water of dogs infected with *P. canis* be examined, it will be found to contain in considerable quantity the finely granular casts and detritus so characteristic of blackwater fever urine. A similar observation has been made repeatedly by the reviewer in the urine of patients suffering from paroxysmal haemoglobinuria. Now, in both these conditions haemoglobinaemia is a well-marked phenomenon, and there is no reason to doubt that it precedes and is the cause of the haemoglobinuria. As a result of examination of the kidneys of dogs infected with *P. canis*, the reviewer (1911) concluded that granular material was derived from the haemoglobin excreted through the epithelium of the renal tubules.

From this discussion it will be seen that the bulk of pathological and experimental evidence is overwhelmingly against PLEHN's theory of a primary renal lesion with haemoglobinuria as a secondary phenomenon. Profound degeneration of the renal epithelial cells is not found and the granular detritus and casts seen in the urine and renal tubules are not derived from disintegrated epithelial cells. Dislodgment of the epithelial cells, and such degeneration as does occur is a

secondary matter and probably due, in part at least, to mechanical causes. The serum proteins and red cells which are found in the urine in severe cases of blackwater gain access to the tubules through the lesions produced by dislodgment of the epithelium.

In conclusion, it must be pointed out that although it is clear that a sudden, and often enormous, haemolysis occurs in blackwater fever, nothing is known regarding the mechanism by which it is produced or where it takes place. In paroxysmal haemoglobinuria the work of DONATH and LANDSTEINER (1904), WIDAL and ROSTAINE (1905), EASON (1906) and others has shown that haemolysis takes place in the peripheral blood and that cold is the exciting cause. The precise mechanism of autolysis in this condition has recently been studied in great detail by YORKE and MACFIE (1921), and a simple method of determining the existence of the autolysin described. No autolysin has, however, been found in the blood of blackwater fever patients (BARRATT and YORKE, and others). DUDGEON (1920) records that he has succeeded in demonstrating a haemolytic action of acetone and alcohol extracts of the spleen, kidneys and urine of patients who have died of blackwater, and that this substance was not found in the urine and organs of persons who had died of other diseases ; and NIERENSTEIN (1919) states that he has found in the urine of blackwater patients a derivative of quinine—haemoquinic acid—which exerts a powerful haemolytic action. These observations, however, require confirmation, and in any case their bearing on the haemolysis which occurs in blackwater fever is far from clear.

Very many observations have been made by different authors to determine whether in blackwater fever there is any abnormal sensitiveness of the erythrocytes to hypotonic saline, quinine, etc. The general consensus of opinion is undoubtedly that there is none. CHRISTOPHERS and IYENGAR (1915) conducted a long series of experiments on the effect of haemolytic drugs, toxins and antisera upon the haemolytic point and the association between this point and haemoglobinuria. They found in their experiments, which were conducted upon rabbits, that potassium chlorate, carbolic acid, sodium glycocholate, sodium taurocholate, quinine, diphtheria toxin and pyocyaneous toxin neither induced haemoglobinuria nor had any effect on the haemolytic point ; those substances, however, which caused haemoglobinuria (pyrogallic acid, abrin and haemolytic serum) raised the haemolytic point, but none of these ever produced haemoglobinuria until its action had resulted in a raising of the haemolytic point to 0·9. CHRISTOPHERS and IYENGAR conclude from this that if in blackwater fever, as is generally agreed, there is no distinct raising of the haemolytic point, this may be taken as indicating that the mechanism of haemoglobinuria in this disease is fundamentally different to that occurring in the haemoglobinuria induced by the injection of a toxic substance or of an artificial haemolysin.

The mechanism by which jaundice, which is usually so prominent a symptom in blackwater fever, is produced, is as yet unsolved. In this disease there is abundant evidence of a great production of bile, *e.g.*, the frequent vomiting of large quantities of material heavily charged with bile, the presence of bile pigment in the serum and the post-mortem findings of a gall bladder loaded with dark green, sometimes almost black, inspissated bile. It is important to note that although bile-pigment is usually found in the serum it has only occasionally been discovered in the urine. BARRATT and YORKE

(1914) showed experimentally that the introduction of isotonic haemoglobin solutions into the circulation of rabbits resulted not only in a considerable increase in the volume of bile poured into the gall bladder, but also in the concentration of bile-pigment. No jaundice, however, was obtained by this means, nor has any been noted by the reviewer in cases of paroxysmal haemoglobinuria. It appears, therefore, that the mere existence of haemoglobinaemia, even in a degree far exceeding that which has hitherto been recorded in blackwater fever, is of itself insufficient to produce icterus, and that consequently in blackwater fever there must operate some additional factor about which at present nothing is known. Reference should, however, here be made to the very interesting series of papers by PEARCE, AUSTEN, KRUMBHAAR, and others (1912), who showed that under certain conditions jaundice resulted from the intravenous injections into dogs of haemolytic serum and even after injections of haemoglobin.

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## HELMINTHIASIS.

KHALIL (M.). **An Early Contribution to Medical Helminthology translated from the Writings of the Arabian Physician, Ibn Sina (Avicenna) with a Short Biography.**—*Jl. Trop. Med. & Hyg.* 1922. Mar. 15. Vol. 25. No. 6. pp. 65–67.

A literal translation is given of the chapter on worms in the "Laws of Medicine," an Arabic manuscript in the Oriental Library of the British Museum. The author points out that in this manuscript Avicenna, in A.D. 1131, clearly recognized *Ascaris lumbricoides*, *Taenia* (*saginata*), *Oxyuris vermicularis* and *Ancylostoma duodenale*. Felix mas was advocated for Taenia and hookworm and common salt enemata for Oxyuris. The habitat of the various worms is also clearly defined.

R. T. Leiper.

YOKOYAMA (Toshihisa) & NIWA (Tsuruo). [**A Comparative Study of the Various Methods of Examination of the Eggs of the Intestinal Parasites.**]—*Nihon Shokakibyo Gakkwai Zasshi* (*Japan Jl. of Gastro-Enterology*). 1922. Jan. Vol. 21. No. 1. [Summarized in *Japan Med. World.* Tokyo. 1922. Apr. 15. Vol. 2. No. 4. p. 116.]

The author finds from a comparison of different processes that the combined method of floating and sedimentation is the best in general practice for the examination of the eggs of intestinal parasites.

R. T. L.

CAMERON (Thomas W. M.). **The Dog as a Carrier of Disease to Man.**—*Lancet.* 1922. Mar. 18. pp. 564–565.

The paper gives a valuable summary of the various helminth infestations of the dog and discusses their bearing on human disease. The author notes the presence of a second species of the double-pored tapeworm, *Dipylidium sexcoronatum*, and suggests the probability of its occurrence as a parasite of man. In spite of his historical rôle of hunter, protector and friend of man, the dog should be "treated as a dog and not as a human being."

R. T. L.

FAIRLEY (N. Hamilton). **Observations and Reflections on the Toxicity, the Immunity Response, and the Treatment of Certain Helminthic Infestations.**—*Australasian Med. Congress. Transactions of the Eleventh Session held in Brisbane, Queensland, 21st-28th August, 1920.* pp. 227–239. (Discussion, p. 239.)

This paper reviews recent work and is largely devoted to a repetition of the author's published results [see this *Bulletin*, Vol. 19, p. 199].

R. T. L.

SMITH (Sidney). **Clinical Notes on a Case of Sporadic Non-Imported *Bilharzia haematobia* contracted in Bolarum, Hyderabad (Deccan).**—*Jl. Roy. Army Med. Corps.* 1922. Apr. Vol. 38. No. 4. pp. 300–302.

The terminal-spined eggs of *S. haematobium* were found microscopically in the faeces of a British soldier stationed at Secunderabad.

A few eggs were subsequently found in the urine, and it appeared on enquiry later that the specimen of faeces first examined contained also urine. There were no clinical signs of schistosomiasis. The patient had gone straight to India with his unit 14 months previously, and before that had never left England. A year previous to the recognition of the infection the patient had been in the habit of taking lonely walks to one or other of two small tanks in the vicinity of Bolarum a few miles from the city of Secunderabad and of bathing in them. An irritating rash of the thighs and abdomen appeared a few days afterwards. He suffered frequently from attacks of vomiting. The author proposes to publish a note later on the molluscan fauna of the tanks from which the infection was acquired.

R. T. L.

HARKNESS (A. H.). *Bilharzia haematobia* **in India.**—*Brit. Med. Jl.* 1922. Mar. 25. pp. 475–476.

A few live ova of *S. haematobium* were found in the urine of a patient examined at the venereal diseases department of St. Peter's Hospital, London. The patient was presumably infected in India, where he had resided for four years.

R. T. L.

HARRISON (P. W.). **Bilharzia in Mesopotamia.** *Indian Med. Gaz.* 1921. Dec. Vol. 56. No. 12. pp. 449–450.

Beni Terrif, a town of about 15,000 inhabitants, is a nest of bilharzia infection. Out of 500 patients treated for general complaints during a stay of one week, the author found one in six to have obvious bilharziasis. Of 30 specimens of urine examined microscopically, 15 showed typical bilharzia eggs. The real incidence of the disease is much greater.

R. T. L.

CAWSTON (F. G.). **Bilharzia Disease in South Africa.** [Correspondence.]—*Brit. Med. Jl.* 1922. June 17. p. 975.

The author records the identification of the cercaria of *S. haematobium* in *Physopsis africana* collected from Baaken's Spruit at Port Elizabeth, Cape Province.

R. T. L.

WOOD (John Y.) **Report on Bo School for Sons of Chiefs during 1920 January to July.** *Sierra Leone Annual Med. & San. Rep. for the Year ending 31st December, 1920.* pp. 47–50.

Forty-six out of 150 boys (*i.e.*, 30·6 per cent.) showed bilharzia eggs in the urine. Practically none reported sick for the condition during the nine months in which the author was in charge. Nearly all the tribes represented are infected, for the infection is found almost immediately after admission.

R. T. L.

BORGES (L.). **Un cas autochtone de Bilharziose en Portugal.** Reprinted from *Bull. Soc. Portugaise des Sci. Naturelles.* 1921. July 15. Vol. 9. 1 p. With 1 text fig.

The author reports the occurrence of a case of *S. haematobium* acquired in St. Luzia, near to Tavira, in Portugal. The patient had suffered for a long time from haemorrhagic cystitis, and in the urine

Dr. B. LOPES had found a parasite, which the author identified as a miracidium of *S. haematobium.* This is the first case recorded as indigenous in Portugal. The note is illustrated with a beautiful microphoto of the *S. haematobium* egg.

R. T. L.

FRANÇA (Carlos). **A Preliminary Note on Bilharziosis Indigenous in Portugal.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Nov. 17 & Dec. 15. Vol. 15. Nos. 5 & 6. pp. 180–181.

The Ibero-Algerian *Planorbis corneus* var. *metidjensis* exercises a very definite chemotaxis for the miracidia of *S. haematobium. P. corneus* and *Physa acuta* are the only molluscs hitherto found in the pond at Tavira, where endemic cases of *S. haematobium* have been recently discovered. In experimental infections the great majority of *P. corneus* die within a short time of being attacked, and in such dead specimens well-developed sporocysts are found. This pronounced pathogenic action of *S. haematobium* upon *P. corneus* is held by the author to explain the slow spread of bilharziasis in Portugal. Fortunately there the endemic area is a small one.

R. T. L.

KAZAMA (Yoshiaki). [**On Pathological Anatomical Findings of the Rabbit infested with** *Schistosomum japonicum*, **especially on the Pathological Changes in the Liver and Kidneys.**]—*Hokuetsu Igakkwai Zasshi* (*Jl. of Hokuetsu Med. Soc.*). 1921. Oct. Vol. 36. No. 5. [Summarized in *Japan Med. World.* Tokyo. 1922. Mar. 15. Vol. 2. No. 3. pp. 85–86.]

The pathological changes following upon the experimental infection of rabbits with *S. japonicum* are ascribed chiefly " to the living phenomena of the worm itself." In the liver sclerosis occurs; in the spleen oedema, proliferation of the stroma and fibroadenia; in the kidneys an atrophic change develops, which is called by the author schistosomic nephritis. In the lungs where the worms lie wedged in the pulmonary arteries there develop proliferation of the interstitial tissues and of the epithelioid cells, either of the alveoli or bronchi. In a severe infection one may meet with atrophy of the thyroid, disturbed secretion of colloid matter, fibroadenoid degeneration of lymphatic glands, also proliferation of the intima and emboli. These changes are attributable to the toxic substances secreted by the worm.

R. T. L.

KAZAMA (Yoshiaki). [**On Enteric Carcinoma in Schistosomiasis japonica, together with a Causative Relation between the Development and the Parasite's Egg.**]—*Gann.* (*Japan. Jl. Cancer Res.*). 1921. Aug. Vol. 15. No. 3. [Summarized in *Japan Med. World.* Tokyo. 1921. Dec. 15. Vol. 1. No. 8. p. 22.]

From a study of nine cases of intestinal carcinoma, which were clearly caused by *S. japonicum*, the author considers that " the carcinomatous change is attribut[able] partly to the heterotropic glandular epithelial cells caused by the presence of the parasite's eggs and to

the adenomatous change caused by the infiltration of the eggs." In some cases, however, a remarkable infiltration of the eggs in the boundary line of the normal and the carcinomatous tissues may prove that the carcinoma has developed from the intestinal glandular epithelial cell. The rôle of the eggs may be partly mechanical and partly toxic.

R. T. L.

CAWSTON (F. G.). **The Emetine Treatment for Bilharzia Disease.**—*Jl. Trop. Med. & Hyg.* 1922. May 1. Vol. 25. No. 9. pp. 112–113.

From experiences with over 300 injections of emetine hydrochloride the author believes that this method of treating bilharzia infections "is free from undesirable toxic effect, and is permanently successful in eradicating the infection." The depressing effects due to the large doses required by adults render it a method which should be confined to children and young persons.

R. T. L.

KHALIL (M.). **On the Susceptibility of the Egg Masses of Planorbis to Drying, Chemical Fertilizers, etc., and its Bearing on the Control of Bilharzia Disease.** *Jl. Trop. Med. & Hyg.* 1922. Mar. 15. Vol. 25. No. 6. pp. 67–69.

Working with *Planorbis corneus* it has been ascertained that the egg masses are very susceptible to drying, and the embryo, at whatever stage of development it may be, dies after five hours' exposure. Ammonium sulphate fertilizer, recommended by LEIPER on account of its lethal action on the adult snails, was found to be lethal to the egg masses in a dilution of 1 in 5,000 during any period of more than 20 hours.

R. T. L.

JONES (S. B.). **Some Notes on Intestinal Bilharziasis in the West Indies.**—*Jl. Trop. Med. & Hyg.* 1922. Feb. 1. Vol. 25. No. 3. pp. 25–27. With 4 figs.

Three cases of *S. mansoni* infection are recorded from Boyd's village, not far from Basseterre, the capital of St. Kitts, and about 24 cases from the village of Colombier, French St. Martin. No cases were found in Anguilla. MANSON's original case with lateral-spined bilharzia eggs in the faeces was reported from Antigua. There is considerable communication between Anguilla and St. Kitts and St. Martin, and the author considers that the disease is a menace to the health of the whole of the West Indian population.

R. T. L.

BETTENCOURT (A.) & BORGES (L.). **Réaction de fixation dans la bilharziose vésicale avec antigène de** *Fasciola hepatica*.—*C. R. Soc. Biol.* 1922. May 13. Vol. 86. No. 17. pp. 1053–1054.

The results obtained by HOPPLI when employing alcoholic extracts of *F. hepatica* adults from sheep's liver in the diagnosis of *Schistosoma mansoni* have not been confirmed by these authors for known cases

of *Schistosoma haematobium* in Tavira. They obtained 17 negatives and 6 positives; and found also that their alcoholic extract was an efficient Wassermann antigen giving results entirely parallel with that of the ox heart antigen.

R. T. L.

HÖPPLI. **Die Diagnose pathogener Trematoden durch Blutuntersuchung.** [Diagnosis of Pathogenic Trematodes by Blood Tests.] —*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 12. pp. 365–366.

Alcoholic extracts of the livers of sheep infected with *Fasciola hepatica* gave complete fixation of complement with sera of patients infected with *Schistosoma mansoni*. This antigen may therefore prove of practical utility where the livers of infected snails are not available for FAIRLEY's test. This antigen gives, however, a positive reaction with syphilitic sera. Many full grown oxen in which no lesions were found reacted positively, while young animals usually reacted negatively. [No experimental data are given.]

R. T. L.

KOBAYASHI (Harujiro). [**On the Special Condition which is needed for the Development of the Endoparasitic Trematodes, in Special Reference to the Reason why Pulmonary Distomiasis is present endemically.**]—*Chosen Igakkwai Sasshi* (*Jl. of Korean Med. Soc.*). 1921. Dec. No. 36. [Summarized in *Japan Med. World.* Tokyo. 1922. May 15. Vol. 2. No. 5. p. 139.]

It is essential for the prevalence of lung fluke disease that in one and the same district there should prevail (*a*) the first intermediary; (*b*) the second intermediary; (*c*) the custom of eating crabs in the raw state by the inhabitants.

R. T. L.

ONORATO (Raffaele). **La paragonimiasi in Tripolitania.** *Arch. Ital. Sci. Med. Colon.* Tripoli. 1920. Jan. Vol. 1. No. 1. pp. 1–13. With 1 text fig.

The case of paragonimiasis here recorded is the first case reported in Tripoli. On account of haemoptysis the case was at first mistaken for one of pulmonary tuberculosis. Some signs were noted in the lungs, especially in the left apex. A marked secondary anaemia was found. The sputum examination showed blood and pus corpuscles and some ovoid bodies 85–97$\mu$ by 45–56$\mu$, yellowish brown in colour. When cleared with a drop of glycerine each egg was seen to have a thin polished wall with a double contour, enclosing a number of small granular cells with one larger cell at one of the poles. By exclusion of other possibilities the egg was recognized as that of *Paragonimus westermanni*. The patient was treated with inhalations (balsamic) and tonic injections. He died shortly after an attack of haemoptysis, but an autopsy was not possible. Up to the present Professor Onorato has been unable to find the larvae of this distome in any of the fresh water animals in Tripoli.

J. Rosslyn Earp.

RYUJI (Setsuzo). **Diagnostical Value of Complement Fixation in Distomiasis.**—*Okayama Igakkwai Sasshi* (*Jl. Okayama Med. Soc.*). 1922. Jan. No. 384.

Alcoholic extracts of the moist livers of rabbits infected with *Clonorchis sinensis* gave the following results in complement tests :—

Positive. 10 experimentally infected rabbits.
3 do. do. dogs.
60 per cent. of cases of moderately or heavily infected human beings.

Negative. 12 normal rabbits.
3 do. dogs.
11 do. human beings, infected patients showing no symptoms.

No pseudo-positive reactions were obtained with cases of infection with :—ascarids, ankylostomes, Trichocephalus, or *Treponema pallidum* ; also catarrhal jaundice not due to Clonorchis and cancer of the liver did not cause the serum to react positively. The technique is complicated and it is concluded that the examination of the faeces is an easier and always reliable method.

R. T. L.

LÉON (N.) & CIUREA (I.). **Un nouvel echinostome chez l'homme.**—*C.R. Soc. Biol.* 1922. June 24. Vol. 87. No. 23. pp. 262–264. With 1 text fig.

In the stools of a Roumanian peasant Léon found at Jassy, in 1916, a trematode which at first was identified as *Echinostoma ilocanum* (*Annales scientifiques de l'Université de Jassy*, 1920, Vol. 10, Nos. 3 & 4). Further examination proves that the worm belongs to a new species of Euparyphium named *E. jassyense*. This species differs from others in the same genus, especially in the location of the testes in the anterior part of the body and in the size of the eggs, which measure 0·132–0·154 mm. by 0·079–0·085 mm. A good figure illustrates the text.

R. T. L.

HERNAULT (J.). **Le Fasciolopsis Fulleborni.**—*Bull. Méd. Franco-Chinois.* Pekin. 1920. July–Oct. Vol. 1. No. 1. p. 38. With 1 plate.

A case of infection with *Fasciolopsis fulleborni* is briefly recorded. The patient was a medical student, age 26, from Haohing, who had suffered for several years from chronic fever and intractable diarrhoea. The note is chiefly of interest on account of the text figure by Professor BRUMPT illustrating the large cirrus pouch which is presumed to be a characteristic of this species.

R. T. L.

EDWARDS (F. W.). **The Carriers of** *Filaria bancrofti*.—*Jl. Trop. Med. & Hyg.* 1922. June 15. Vol. 25. No. 12. pp. 168–170. With 1 text fig.

To the special Manson number of the *Journal of Tropical Medicine and Hygiene* the writer contributes a useful list of the mosquitoes which have been implicated as efficient or partially efficient intermediaries for the *Filaria bancrofti*. Seven species are noticed as

intermediaries in which complete development has been observed, viz.: (1) *Culex fatigans*; (2) *Aëdes* (*Stegomyia*) *variegatus* (syn. *Culex scutellaris* (Walker nec Theobald), *Stegomyia pseudoscutellaris*); (3) *Aëdes* (*Finlaya*) *togoi*; (4) *Taeniorhynchus* (*Mansonioides*) *africanus*; (5) *Anopheles* (*Myzomyia*) *rossi*; (6) *Anopheles* (*Myzomyia*) *costalis*; (7) *Anopheles* (*Anopheles*) *algeriensis*. Twenty-three species are listed as forms in which partial development only has been observed, viz.: (1) *Aëdes argenteus* (*Stegomyia fasciata*); (2) *Culex sitiens* (*C. jepsoni*, *C. micro-annulatus*); (3) *C. bitaeniorhynchus*; (4) *C. gelidus*; (5) *Aëdes* (*Stegomyia*) *albopictus* (*Culex albopictus*, *Stegomyia scutellaris*); (6) *A.* (*S.*) *galloisi*; (7) *A.* (*S.*) *chemulpoensis*; (8) *A.* (*S.*) *argenteus* (*Stegomyia fasciata*); (9) *A.* (*S.*) *perplexa*; (10) *A.* (*S.*) *desmotes* (*S. gracilis*); (11) *A.* (*S.*) *albolineatus*; (12) *A.* (*Ochlerotatus*) *caspius* (*Culex penicillaris*); (13) *Taeniorhynchus* (*Taeniorhynchus*) *pseudotitillans*; (14) *T.* (*Mansonioides*) *annulipes*; (15) *Anopheles* (*Anopheles*) *maculipennis*; (16) *A.* (*A.*) *bifurcatus*; (17) *A.* (*A.*) *hyrcanus* (*sinensis*); (18) *A.* (*A.*) *hyrcanus* var. *vanus* *Myzorhynchus nigerrimus*, *M. minutus*, *A. pseudopictus*); (19) *A.* (*A.*) *hyrcanus* var. *peditaeniatus*; (20) *A.* (*A.*) *barbirostris*; (21) *A.* (*Myzomyia*) *annulipes*; (22) *A.* (*Nyssorhynchus*) *albimanus* (*albipes*); (23) *A.* (*N.*) *argyrotarsis*.

Twelve species are given as having been tested for filarial infection by various workers with negative results, viz.: (1) *Armigeres* (*Armigeres*) *obturbans* (Walker); (2) *A.* (*A.*) *jugraensis* (Leicester); (3) *A.* (*A.*) (*Leicesteria*) *flava* (Leicester); (4) *A.* (*L.*) *dolichocephala* (Leicester); (5) *A.* (*L.*) *annulitarsis* (Leicester); (6) *Heizmannia metallica* (Leicester); (7) *Aëdes* (*Finlaya*) *notoscriptus* (Skuse); (8) *A.* (*Skusea?*) *amerii* (Ludlow) (syn. *Stegomyia fusca*, Leic.); (9) *A.* (*Ochlerotatus*) *vigilax* (Skuse) (? also recorded as *C. nigrithorax* and *C. procax*); (10) *A.* (*Aëdes*) *butleri* (Theobald); (11) *A.* (*A.*) *croensis* (Yamada); (12) *A.* (*Myzomyia*) *funestus* (Giles).

In addition, three forms are given here which also appear in the list of those in which a partial development has been observed.

R. T. L.

BLACKLOCK (B.). **The Signs of Filarial Disease.**—*Ann. Trop. Med. & Parasit.* 1922. July 20. Vol. 16. No. 2. pp. 107–117. With 1 text fig.

The signs of filarial disease are so varied in character and so diverse in their relationship to the presence of microfilariae that it is well to adopt some such standard as that of STEPHENS for tabulating results. The author has so arranged his statistical studies of 240 natives of Sierra Leone with a view to establishing a correlation between "signs of filarial disease" and the occurrence of *Microfilaria bancrofti* in the blood. The figures obtained do not show the same kind of correlation as do the figures obtained by STEPHENS in his analysis of MANSON-BAHR's Fijian cases. The figures in the present series actually show that there is no more correlation with the presence of microfilaria than with hernia. The author considers that "signs of filarial disease" is a term which requires a further and critical examination and modification. To diagnose filarial disease from the discovery of enlarged glands, hydrocele, and so on, may be as misleading as to diagnose malaria simply from enlargement of the spleen.

R. T. L.

FLU (P. C.). [In Dutch & English.] **Beschouwingen naar aanleiding van een onderzoek over de verbreiding van *Filaria bancrofti* onder de inlandsche bevolking van Weltevreden. Some Notes on an Inquiry on the Spread of *Filaria bancrofti* among the Native Inhabitants of Weltevreden.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1921. Pt. 3. pp. 330–363.

Although the conditions for the spread of filaria in Batavia are favourable the degree of infection appears to be slight. Of 1,112 male natives of Weltevreden examined between 9 and 11 p.m., 95, *i.e.*, 8·5 per cent., were found to have microfilariae. The figures vary for various districts from 2·3 per cent. to 15 per cent. The filaria of Batavia is *F. bancrofti* and shows nocturnal periodicity. The most suitable carriers proved to be *Culex fatigans* and *Stegomyia scutellaris*. The following mosquitoes were also experimentally infected: *Myzomyia* (*Anopheles*) *ludlowi* and *M.* (*A.*) *rossii*. In the Anopheles large numbers of the larvae perished. The climate and temperature of Batavia are very suitable for the spread of the parasite. The mean temperature is 27° C. The coast climate is not only warm but also damp, thus affording favourable conditions for the invasion of the definitive host. Another important factor is the fixed location of the population. Persons from a region free of filaria who live in a country strongly infected with the parasite do not become infected for years. In Weltevreden there is a large moving population, and the author considers that these act as "traps," absorbing a large proportion of the larvae from the infected mosquitoes, thus reducing the chances of infection in the local residents.

R. T. L.

SUGANUMA (Seijiro). **Contributions to the Knowledge on the Periodicity of the *Filaria bancrofti*.**—*Japan Med. World.* Tokyo. 1921. Dec. 15. Vol. 1. No. 8. pp. 1–4.

Repeated use of LOW's standard 20 cmm. of blood for the counting of microfilaria having shown that the method is quite undependable, the author adopted the acetic acid concentration method of SMITH and RIVAS and found that periodicity of the microfilariae had no absolute significance, though a distinct relative one. Further, the microfilariae showed no marked difference in numbers in capillary and venous blood taken at the same time. By using an apparatus in which a tube containing blood with microfilariae was connected by a capillary to a tube containing blood free from microfilariae but containing chemotropic substances, the author ascertained that the microfilariae showed "strong positive chemotropism against carbon dioxide, urea, uric acid and grape sugar, but quite negative chemotropism against ammonia." Investigations upon the periodical fluctuation of non-protein nitrogen, of gas content, and of sugar content, and of their relation to the microfilarial periodicity led the author to conclude that this periodicity and food intake have no intimate relation, that the regular fluctuation of blood-gas is surely connected with the microfilarial periodicity, but that there are other still more important factors, among which a strong negative heliotropism is the most striking.

R. T. L.

McFarland (William L.). **Observations on the Microfilaria of** *Filaria bancrofti.*—*Amer. Jl. Trop. Med.* 1922. May. Vol. 2. No. 3. pp. 187–194.

During 1918 the staff of the Board of Health Laboratory in the Panama Canal Zone examined several hundred thick blood smears for malarial parasites. The opportunity was taken to make simultaneously a filarial survey. The blood of 1,124 individuals was examined. In 504 brush cutters the smears were taken between 3 a.m. and 7 a.m. Twelve were positive. Of 556 smears taken from ward patients in the Ancon and St. Tomas hospitals between 7 and 8 a.m. and 7 and 8 p.m., 21 were positive. Not one of the 34 positives was under observation or treatment for any condition attributable to filariasis. [The population in Panama is constantly shifting, and of foreign nationalities, and little importance can be attached to the results recorded here.]

R. T. L.

Suganuma (Seijiro). [**On the Count of Microfilaria.**]—*Chugai Iji Shimpo* (*Internat. Med. News*). 1921. Aug. No. 994. [Summarized in *Japan Med. World.* Tokyo. 1921. Dec. 15. Vol. 1. No. 8. p. 24.]

A new method for the counting of microfilaria is to stir thoroughly 1 cc. of blood with 100 cc. of a 3·5 per cent. solution of acetic acid and 10 cc. of acetic acid saturated with fuchsin. The mixture should be centrifuged and the supernatant fluid removed by means of a pipette. The residue is washed once or twice with water and again centrifuged. The sediment is examined microscopically and the count made by means of ruled glass.

R. T. L.

Connal (A.) & Connal (S. L. M.). **The Development of** *Loa loa* **(Guyot) in** *Chrysops silacea* **(Austen) and in** *Chrysops dimidiata* **(Van der Wulp).**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1922. Mar. 16 & May 18. Vol. 16. Nos. 1 & 2. pp. 64–89. With 28 figs.

This important communication amplifies a preliminary note published in 1921 (see this *Bulletin*, Vol. 19, p. 225). The experiments made with Chrysops at Sapele between May and July, and at Calabar in December, have enabled the authors to describe and figure the whole development of *Filaria* (*Loa*) *loa*. These experiments were carried out with wild flies, as the development of the local species of Chrysops is unknown and the hopes of rearing clean flies from larvae or pupae did not materialize. The percentage of naturally infected flies during June and July proved to be 3·5 per cent. as a result of a dissection of 225 wild flies. Moreover, it was possible to recognize even a small feed of blood through the abdominal chitin for at least two days, so that with a two days' detention it was easy to detect any natural infection in view of the rapid growth and morphological changes which take place in the worms. The developmental changes undergone by the embryos of *L. loa* in Chrysops resemble those described for *F. bancrofti*. Certain differences occur, chiefly in the site of development, the attitude of the developing forms, their retention of the power of movement, and the size of the mature larva.

Ten days is the usual period required for the completion of the life-cycle in the insect host. The appearances seen from day to day are described and illustrated. During the third day the gut becomes complete. The body is now more of a torpedo shape, and, *in situ*, it has a double coil. The length is from 280 to 300$\mu$. On the fourth day the short stumpy shape is lost. Throughout the fifth day the length increases, reaching 0·8 to 1 mm. On the sixth day the cork-screw appearance is replaced by gentle curves and the worm peels. The sharp-pointed tail is replaced by a rounded and trilobed caudal end. The worm continues to increase in length, and on the tenth day measures 2 mm. long and 25$\mu$ broad The earlier stages of development take place in the muscular and connective tissue, principally in the abdomen of the flies, but also in the thorax and the head. Migration takes place from the seventh day, and by the tenth day the larvae are congregated in the head, mainly at the root of the proboscis. Evidence was procured that flies can remain infective for from five to six days.

R. T. L.

CHARLES (E.). **Removal of Filaria from under the Conjunctiva.** — *Brit. Jl. Ophthalm.* 1922. July. Vol. 6. No. 7. pp. 321–322.

A resident of Sialkot district, near Jammu State Territory, developed a swelling on the inner and downward side of his eyeball beneath the ocular conjunctiva. The vision was not affected, but there was redness, watering, the pupil was dilated and the patient suffered great pain. A female worm measuring 33 mm. in length by 2 mm. in width was removed, but was much contracted and shrunken when it was examined later by Major SEWELL. The cuticle was transversely striated. In all probability the worm was an example of *Filaria conjunctivae* Addario.

R. T. L.

GRIFI (Vincenzo). **Manifestazioni nervose da elmintiasi.** [Nervous Manifestations of Helminthiasis.]—*Policlinico.* Sez. Prat. 1922. Feb. 27. Vol. 29. No. 9. pp. 292–293.

Nervous affections, often of a most varied and indefinite nature, have for a long time been attributed to the presence of intestinal parasites in children ; such symptoms, for example, as tonic or clonic spasms, epileptiform convulsions, hysteria, psychical disturbances, and so forth. In view of the gravity of the symptoms manifested in the following case the author considered it worthy of being placed on record.

A boy, eleven years of age, previously healthy, was suddenly seized with vertigo, weakness of the legs and a staggering gait, and fell to the ground. He was unable to rise, but exhibited no convulsions or loss of consciousness, no fever, vomiting or sphincter involvement. When brought to the hospital [how long after the onset is not stated] he had a marked spastic gait, the toes scraping along the ground and the knees somewhat rigid ; Romberg's sign was not present and there was no affection of the cranial nerves. There was increased muscular tonus with brisk reflexes in the upper limbs, marked increase of deep reflexes in the lower, with a positive (extensor) Babinski response. Speech was slurring. In getting down from the couch he suddenly fell backwards with body and legs rigid, and sustained a lacerated and contused wound of the head. Medical men present thought the child was suffering from tetanus,

but no symptoms of this condition were confirmed. As a history was volunteered of the passage of ascarides some days previously, santonin was prescribed. As a result he passed several more ascarides and all the symptoms cleared up, the reflexes became normal, and the gait no longer spastic.

The author is of opinion that a toxin produced by the ascaris may act either directly upon the pyramidal tracts after being absorbed from the intestine, or indirectly by effecting changes in the endocrine glands and so bringing about tetanus-like symptoms.

H. Harold Scott.

MOORE (Allen H.). **Intestinal Parasites as a Frequent Cause of Undiagnosed Maladies in Children.**—*Jl. Amer. Med. Assoc.* 1922. Apr. 22. Vol. 78. No. 16. p. 1197.

A discussion of the importance of the intestinal helminthiases is followed by reports of five cases of ascarid infection with symptoms resembling those of typhoid intussusception, convulsions, choking and vomiting, and acute toxaemia respectively.

R. T. L.

PESSÔA (Samuel B.). **A Case of Severe Ascaris Infestation.**—*Jl. Amer. Med. Assoc.* 1922. Apr. 29. Vol. 78. No. 17. p. 1294. With 2 text figs.

A negro boy, aged 6, showed symptoms resembling abdominal tuberculosis. Examination of sputum and application of the intradermal test for tubercle were both negative and there was an 8 per cent. eosinophilia. Ascaris ova were found in the faeces. On treatment 558 ascarids were expelled, and abdominal symptoms disappeared at once and the pulmonary symptoms and the fever shortly after. Nervous symptoms were absent throughout, and there were no signs of intestinal obstruction. This was considered an example of mass infection, since all the worms were at about the same stage of development. The majority of the worms were immature.

R. T. L.

PENTAGNA (O.). **Ascaridiasi ed orticaria.** [Ascariasis and Urticaria.] —*Pediatria.* 1922. Apr. 1. Vol. 30. No. 7. pp. 308–313.

After a brief résumé of various opinions which have been held relative to the question whether ascaris secretes a poison or not, the author concludes that the toxicity of intestinal worms is not an established fact, though they are capable of "provoking certain organic reactions." Details of two cases are given.

The first, a child of 2½ years, a fortnight before being brought to hospital was attacked by fever and a morbilliform rash which faded in a few days and was succeeded by pain in the left iliac region and the passage of stools containing mucus and streaks of blood. The child was slightly rachitic. The abdomen was rigid and a swelling the size of a large egg was felt in the left lower quadrant; the left leg was kept flexed and attempts to extend it appeared to cause intense pain. Nothing else abnormal was noted except that the blood examination revealed a leucocytosis of 19,990 with 84 per cent. polymorphonuclears, only 1 per cent. eosinophiles. The fever and the swelling gradually subsided after admission to hospital, but on the 14th day there was an attack of urticaria with slow, irregular pulse, and these symptoms were noticed each time

prior to the elimination of ascarides. As a result of treatment with santonin the worms were expelled and the other symptoms cleared up. A second case, a boy of 6 years of age, was very similar, except that there were no localising symptoms in the abdomen.

Urticaria in association with hydatid cysts has been noted repeatedly and accounted for by the suggestion that the albumen from the parasite may traverse the cyst wall, stimulate the production of antibodies and set up anaphylactic shock with urticaria as a symptom. The author expresses the opinion that the attacks of urticaria preceding each expulsion of ascarides in his cases may be explained in an analogous manner.

H. Harold Scott.

CALDWELL (Fred C.). **A Death caused by Ascarides.**—*Amer. Jl. Trop. Med.* 1922. May. Vol. 2. No. 3. pp. 213–214.

A baby girl, aged 22 months, was treated with ½ minim of oil of chenopodium followed by Epsom salts and a saline enema. Innumerable ascarides were expelled in the faeces, and masses began to form in the abdomen. Ascarides came from the nose and mouth and collected in the throat, and death due to blocking of the larynx occurred 12½ hours after the beginning of the treatment. Ten hours after death ascarides were still issuing from the mouth.

R. T. L.

ASADA (Junichi). [**On the Cutaneous Infection by Ascaris, together with a Notice on a New Method of Cultivation of the Eggs of Ascaris.**]—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1921. July. No. 2238. [Summarized in *Japan Med. World.* Tokyo. 1921. Dec. 15. Vol. 1. No. 8. p. 14.]

The author has made experiments to ascertain the probability of cutaneous infection in the field from hatched ascaris larvae and has arrived at positive results in experiments on animals.

R. T. L.

KONDO (Kiichi). [**Contribution to the Experimental Knowledge of Ascaris.**]—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1922. Jan. No. 2263. [Summarized in *Japan Med. World.* Tokyo. 1922. Apr. 15. Vol. 2. No. 4. p. 112.]

Eggs of ascaris, cultivated in fertile soil, hatched and the larvae escaped into the soil. The author found that they would live for two months in the faeces and for more than one month in the soil.

R. T. L.

KOHGI (Chinichi). [**On the Histological Changes of the Animal Tissues caused by the Invasion of Ascaris. (II. Communication.) The Feature of the Leucocytes in the Circulating Blood.** —*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1921. Dec. No. 2256. [Summarized in *Japan Med. World.* Tokyo. 1922. Mar. 15. Vol. 2. No. 3. p. 76.]

The author fed normal animals with ripe eggs of ascaris and examined the blood from the following day. The results showed an eosinophilia even before the ascaris was fully grown.

R. T. L.

BAER (Jean G.). *Tricocephalus dispar.* [Correspondence.]—*Lancet.* 1922. May 13. p. 968.

Professor FUHRMANN's method of finding the eggs of *T. dispar* is to add to a small quantity of faeces a few cc. of 20 per cent. HCl and shake well. A little ether is then added. The specimen is shaken and centrifuged. The eggs alone will then be deposited.

R. T. L.

DUQUE LINCE (E.). **Colitis tricocefaliana.**—*Repert. de Med. y Cirug.* 1922. Feb. Vol. 13. No. 5. (No. 149.) pp. 246–274.

The author ascribes a fourfold pathological effect to the presence of trichuris in the intestine, namely (1) irritant and inflammatory; (2) acting as a transmitter of bacteria; (3) toxic; (4) interfering with nutrition. By their direct action they produce small wounds, haemorrhages and foci of suppuration.

Of the various forms of diarrhoea resulting from their presence the commonest is a dysenteric type, more rarely sufficiently severe to be considered as enteric fever or tuberculous peritonitis.

The degree of anaemia may be excessive; the red corpuscles in one instance being reduced to 600,000 per cmm., due, he thinks, to frequent inoculation of small doses of *B. coli* through the wounds inflicted by the worm.

After trial of various drugs—kousso, male fern, eucalyptus, beta-naphthol, thymol, oil of chenopodium, and latex d'higuerón—the conclusion was reached that only the last had a specific action on the trichuris. The method of administration is as follows:—The patient is given a milk diet for two or three days and on the last evening he has a dose of calomel "to clear away the mucus and expose the worm." The next morning 40–60 gm. of the latex are given in two doses in a little milk at an hour's interval. If this does not act as its own purge castor oil or saline aperient is given.

H. Harold Scott.

SPRUIT (Charles B.). **The Treatment of Trichuriasis with Leche de Higueron.**—*Amer. Jl. Trop. Med.* 1921. Nov. Vol. 1. No. 6. pp. 375–380.

Sap of Higueron possesses only a slight vermicidal action on ascaris and hookworm, but has a definite effect on the whipworm. The author treated 18 cases with fresh juice, the dose consisting of 16 cc. in half a cup of milk at 6 a.m. and repeated at 8 a.m. This was followed by 60 cc. of castor oil at 10 a.m. On the preceding day the patient had been given liquid diet only, and at 8 p.m. he had received 30 cc. of cream of tartar in a glass of sweetened water. In 11 cases, *i.e.*, 61 per cent., of this series, the parasites were voided [in no case numbering more than 13]. A second series of 12 cases were treated with chloroformed juice, the dose was raised to 20 or 30 cc., and magnesium sulphate was given in place of castor oil. In 6 cases, *i.e.*, 50 per cent., trichuris were passed and from 1 case 101 specimens were collected along with 125 hookworms. When the pure juice was used there were no subjective symptoms. Occasionally there was a temporary discomfort from a burning sensation in the rectum and around the anus. The chloroformed juice had a sickening

sweet taste and gave rise to frequent eructations of gas. The addition of an equal amount of chloroform and storage in the icebox preserved the juice from fermentation. Tricresol 0·5 per cent. and glycerine 50 per cent. also prevented fermentation.

R. T. L.

KOBAYASHI (H.). [**Resistance of the Eggs of Helminthes against Various External Conditions.**] —*Mitt. med. Hochschule.* Keijo. 1921. Vol. 4. pp. 21–31. [Summarized in *Physiological Abstracts.* 1922. Apr. Vol. 7. No. 1. p. 13.]

The eggs of *Ascaris lumbricoides* survive for more than one month in urine, and for several days in 1–4 per cent. ammonia at low temperatures. They resist putrefaction of urine and develop in a strong solution of NaCl. Eggs of *Trichocephalus trichiuris* also resist putrefaction, but not salt. For the development of hookworm larvae traces of faecal matter are necessary; to kill the eggs the faeces should be left in contact with undiluted urine for at least one month.

R. T. L.

CORFIELD (C. Russell) & HIRSON (Bernard). **A Case of Acute Ascariasis associated with** *Trichuris trichiura* **complicating Pregnancy.**—*Lancet.* 1922. May 20. pp. 995–996.

The patient was a Turkish woman, three months resident in England and three months pregnant. A provisional diagnosis of acute gastro-enteritis was made on admission. The patient presented a typical picture of starvation with severe vomiting. After santonin these symptoms rapidly subsided with expulsion of 30 worms, some of which were vomited, others passed in the faeces, together with two specimens of *Trichuris trichiura.*

R. T. L.

SEMON (Henry C.). **Trichotillomania due to Threadworms.** —*Brit. Med. Jl.* 1922. Apr. 22. p. 641. With 1 text fig.

Trichotillomania had persisted in this patient, a boy aged 6 years, since the age of 3. Epilation was mostly with the right hand from the left frontal area and was apparently unconscious, but was not practised during sleep. Latterly he had also pulled out his mother's hair. The boy was mentally bright, but his appetite was capricious, and threadworms had been noticed from the age of 18 months. Anthelminthic treatment, as recommended by STILL, was instituted. In a fortnight epilation ceased. A month later no relapse had occurred and the anaemia and appetite were improving.

R. T. L.

GLÄSER (Hans). **Die Empfindlichkeit von Ratte und Maus gegen Trichineninfektion.** [The Susceptibility of Rats and Mice to Trichinosis Infection.]—*Arb. a. d. Reichgsndhtsamt.* 1920. Dec. Vol. 52. No. 4. pp. 573–595.

The author's experiments agree with those of STAÜBLI in showing the great susceptibility of rats and mice to intestinal trichinosis. He has also established their susceptibility to muscle trichinosis. The average time at which the animals died after being fed with trichinosed flesh he calls the critical time. This critical time for intestinal trichinosis is 2–4 days after feeding, for muscle trichinosis 23–26 days.

In exceptional cases death can ensue from intestinal trichinosis on the 10th day and from muscle trichinosis on the 15th, 29th and 30th day. In one case it even occurred on the 70th day. Death does not depend on the amount of diseased meat eaten, but on the number of Trichinae it contains—in rats death follows after eating diseased pig's flesh containing 350 worms and after diseased rat's flesh containing about 8,000. For mice the "dosis mortalis" is about 1,200 Trichinae in rat's flesh. Death is due to toxins given off from the parasites—mice died after being subcutaneously injected with normal saline in which encapsuled muscle Trichinae had lain for an hour at 37° C. On account of their great susceptibility to Trichinae the author concludes that rats and mice are not the normal or principal hosts of these parasites, for death interrupts the life cycle. In some cases, however, where a "mortal dose" is not taken rats and mice can survive and so carry on the infection. Therefore, although the pig must be regarded as the principal host, the rat and mouse play the part of intermediate hosts and in places where pigs are suffering from trichinosis those vermin must be exterminated.

R. T. L.

Ducas (Robert). **L'immunité dans la Trichinose.**—47 pp. 1921. Paris: Jouve & Cie., Editeurs, 15, rue Racine.

From a study of the development of immunity in rats against infection with *Trichinella spiralis* in which an aqueous extract of infected meat was used, the author found:—

(*a*) The Bordet-Gengou reaction inconclusive with sera of infected rats.

(*b*) The precipitin test negative except with very large quantities of antigen.

(*c*) The anaphylactic-ophthalmic reaction negative.

(*d*) No tolerance to the toxic effect of the extract after successive intraperitoneal injections into normal animals.

(*e*) The sera of infective animals had no curative or prophylactic value.

The author considers that rats show a certain degree of immunity against a second infection and that the resistance of the animals lies in the small intestine, since in rats surviving a second infection no adults can be found in the intestine. A similar absence occurs in the intestines of the hen, which is naturally immune to trichinosis.

R. T. L.

Schwartz (Benjamin). **Effects of X-Rays on Trichinae.** -Reprinted from *Jl. Agric. Research.* 1921. Mar. 1. Vol. 20. No. 11. pp. 845–854.

Experiments made to determine the effect of X-ray radiation on Trichinae in pork were made in co-operation with a commercial firm with a view to its practical application. Apart from the fact that the expense may render the procedure impracticable, the author considers that much more experimental work is required to demonstrate whether this treatment could be depended upon to destroy Trichinae. Relatively heavy dosages of X-rays injure encysted Trichinae, but the injuries are not visible in the encapsuled larvae, and only become apparent when the larvae reach a suitable host in whose intestine

they normally can develop. In such the Trichinae undergo rapid granular degeneration. Where lower dosages have been exhibited the encysted larvae continue to develop in the intestine, but do not attain structural or functional sex maturity. The sex cells appear to be atrophied and the X-rays appear, therefore, to have exerted a more or less selective action on the gonads of the Trichinae. There is considerable variation in susceptibility.

R. T. L.

SAWYER (W. A.). **Hookworm in Australia.**—*Australasian Med. Congress. Transactions of the Eleventh Session held in Brisbane, Queensland, 21st–28th August, 1920.* pp. 290–295. With 1 chart in text.

Although hookworm in Australia is serious it is confined to irregular areas with fairly sharp boundaries and determined principally in shape and position by the amount of rainfall. The influence of soil appears to be a minor factor. Where there is a high rainfall (over 50 inches) control measures become difficult. In Queensland there is an area of high prevalence in the region of high rainfall extending from Cooktown to Ingham. From Townsville to Bowen the infection and rainfall are low. Between Proserpine and Mackay the rainfall and infection are again high. Around Nambour and Landsborough there is considerable infection with high rainfall. South Australia State is entirely free from endemic hookworm disease. In Papua the natives on the plantations are highly infected. Towns built over the sea shore are almost free.

R. T. L.

CRICHLOW (Nathaniel). **Report on Hookworm Disease in the British Solomon Islands.**—*Jl. Trop. Med. & Hyg.* 1922. May 15. Vol. 25. No. 10. pp. 123–125.

Every island throughout the British Solomon Islands Protectorate is apparently infected with hookworm. The infection rate can be taken as 85 per cent. among the natives. The "worm" rate is low and not sufficient to cause any clinical manifestations. Bush villages show a higher incidence than saltwater villages. The author does not consider that the infection at the present time constitutes a danger to the natives, but advocates the treatment of infected persons and the control of the disease by the erection of sea or deep pit-latrines and the prohibition of promiscuous defaecation.

R. T. L.

CALDWELL (Fred C.). **An Accidental Infection with** *Uncinaria.* *Parasitology.* 1922. Apr. Vol. 14. No. 1. pp. 51–52.

The history is given of the accidental infection of a laboratory worker with *Necator americanus*. Fluid containing larvae was allowed to run off a slide on to the thumb and middle finger. An intense itching immediately followed. On the following day the areas were inflamed and swollen and contained numbers of minute bright red points. Next day there was marked tenderness under the arm in the region of the axillary glands. On the day following marked bronchitis developed. The stools remained negative for more than a month, becoming positive 38 days after the infection. One treatment with chenopodium removed 20 hookworms and a second treatment proved negative and the faeces no longer contained ova.

R. T. L.

CAIUS (J. F.) & MHASKAR (K. S.). **The Correlation between the Chemical Composition of Anthelmintics and their Therapeutic Values in Connection with the Hookworm Inquiry in the Madras Presidency.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 787–798.

Oil of wintergreen has well-marked anthelminthic properties. Its action is vermicidal. Most of the worms are expelled dead and in a state of flaccidity. It does not remove Ascaris or Trichuris. It is a safe drug. No after-effects were noticed. The percentage of hookworms removed by a test treatment was 46·5 per cent. The anthelminthic value of pure methyl salicylate is practically the same as that of the oil. Salicylic acid and salol are ineffective against hookworms. Methyl salicylate, therefore, exerts a specific action in the unhydrolyzed state. Esterification of B-naphthol and thymol destroys their anthelminthic properties. The so-called "salol principle" cannot be extended to anthelminthics.

R. T. L.

MHASKAR (K. S.). **Delayed Cures in the Treatment of Hookworm Infection.**—*Indian Jl. Med. Res.* 1922. Apr. Vol. 9. No. 4. pp. 799–803.

After one treatment with B-naphthol many cases of hookworm infection are not immediately cured, yet the faeces may become free from ova from 36 to 62 days later. The author regards a second treatment valueless in these cases and suggests that the worms may be affected by the drug and are carried down to the lower part of the intestine, where they are capable of surviving for a limited time only.

R. T. L.

GORDON (R. M.). **Ancylostomes recorded from Sixty-seven Post-mortems performed in Amazonas.**—*Ann. Trop. Med. & Parasit.* 1922. July 20. Vol. 16. No. 2. pp. 223–228.

Six thousand eight hundred and fifty-seven ankylostomes were collected from 67 autopsies performed in the Santa Casa Hospital at Manaos during 1921–22. The proportion of *Ancylostoma duodenale* to *Necator americanus* was 1 : 4·7, whereas the proportion recorded for South Brazil by DARLING was 1 : 45. This is attributed to the high proportion in country dwellers who harboured *A. duodenale*. *A. braziliense* occurred in four post-mortems. The author discusses the relationships of this form, which occurs in the cat and dog in Brazil. He differs from DE FARIA, who regards it as specifically distinct from *A. ceylanicum*. No constant difference could be detected in the size and shape of the inner tooth, nor could any difference be discovered in the length and fineness of the dorso-external ray in the two worms.

R. T. L.

SMILIE (Wilson G.). **The Results of Hookworm Disease Prophylaxis in Brazil.**—*Amer. Jl. Hyg.* 1922. Jan. Vol. 2. No. 1. pp. 77–95. With 6 charts.

In the Ilha do Governador, Brazil, the degree of hookworm infection four years after a successful intensive hookworm campaign and the installation of latrines in more than 80 per cent. of the houses proved

microscopically to be at the rate of 70 per cent., as compared with a rate of 71·2 per cent. before the work was begun. Similar results have been reported from Ceylon, Porto Rico, and various other West Indian islands. These disappointing data may be interpreted in three ways: (1) our knowledge of the mode of spread of hookworm may be at fault; (2) the methods in use in combating the disease are inefficient; (3) the data from which these conclusions are drawn are incomplete and misleading. To obtain further light on the problem a re-survey of Ilha do Governador was recently made and the "worm count" method was used as an index of the degree of infection. Although the microscopical findings showed only a reduction of from 1–2 per cent. in the infection rate, the "worm count" method showed an average of 14 hookworms per case in contrast to an average of 329 hookworms in controls who had never received hookworm treatment. This showed that hookworm infection as determined by the microscopical examination of the faeces for ova is misleading. In a community where proper sanitary measures are being applied not only is there a decrease in the total number of worms harboured, but there is a change in the ratio of male and female worms harboured by the individual. Statistics show that while the two big factors in prophylaxis are latrine construction and intensive treatment, the effects of intensive treatment are evident even after three years in those individuals who do not instal latrines. Hookworm infection is, as a rule, slowly reacquired and rapid massive infections are rare. The soil was undoubtedly heavily infested with hookworm larvae when the campaign began, and the fact that there is not a heavy reinfection during the intervening years indicates that the larvae have not been able to survive a two-year period in the soil. It is unnecessary to institute soil disinfection in hookworm prophylaxis. In communities which have a high degree of hookworm infection, and in which it is impossible to convince the bulk of the community of the necessity of latrine construction and use, the method applied in large East Indian plantations of giving all the individuals a standard treatment of chenopodium once a year is undoubtedly efficient. It yields, however, temporary results only and has no great educative value.

R. T. L.

ACKERT (James E.). **Investigations on the Control of Hookworm Disease. IV. The Relation of the Domestic Chicken to the Spread of Hookworm Disease.**—*Amer. Jl. Hyg.* 1922. Jan. Vol. 2. No. 1. pp. 26–38.

That hookworm eggs can retain their viability and hatch after passage through the gut of domestic chickens has long been known, but the extent to which these animals aid in the spread of the infection has hitherto remained undetermined. The author finds that although the eggs can remain viable and are able to hatch after passage, the great majority fail to produce infective larvae. To some extent dangerous infective spots may be established around drinking receptacles by chickens that have swallowed hookworm eggs day after day. Moreover, newly hatched hookworm larvae can pass, apparently uninjured, through the digestive tracts. A comparison of the reduction of mature larvae by fowls, with the establishment of infective spots, convinces the author that chickens are more beneficial than harmful in the control of hookworm disease in Trinidad.

R. T. L.

ACKERT (James E.) & PAYNE (Florence King). **Investigations on the Control of Hookworm Disease. V. The Domestic Pig and Hookworm Dissemination.**—*Amer. Jl. Hyg.* 1922. Jan. Vol. 2. No. 1. pp. 39–50.

A high percentage of hookworm eggs ingested by pigs are able later to produce infective larvae, but infective larvae do not pass through the gut of the pig. *Strongyloides stercoralis* larvae survive passage through the pig and multiply in the faeces. Evidence was obtained pointing to the probability that *S. stercoralis* can parasitize the pig. Late in the season it was found that the pigs in Trinidad harbour a species of Necator which is named in this paper *N. suillus* n. sp. In a discussion of the bearing of this new factor upon their earlier experiments, the authors show that there is little reason to question their validity.

R. T. L.

CORT (William W.), AUGUSTINE (Donald L.) & PAYNE (George C.). **Investigation on the Activities of Infective Hookworm Larvae in the Soil. Preliminary Report.**—*Jl. Amer. Med. Assoc.* 1921. Dec. 24. Vol. 77. No. 26. pp. 2035–2036.

Both in natural conditions in the field and in laboratory experiments it is a common occurrence for the ensheathed larvae of the hookworm to moult and to continue their life in the unsheathed condition. Fifty-two per cent. to 98 per cent. of ensheathed larvae were found to have moulted when recovered from soil after 15 hours to 11 days. In no single case in a series of experiments were hookworm larvae found to have migrated a greater distance than 4 in. from the spot on the soil where they had been placed, during periods ranging from 15 hours to 42 days. The length of life of infective larvae under natural conditions does not exceed usually 6 weeks. These observations have an obviously important practical bearing on the general question of hookworm control.

R. T. L.

COMPERTS (H. C.). [In Dutch & English.] **Onderzoek naar den invloed van het gebruik van schoeisel op het aantal Mijnwormendragers. Investigations on the Influence of using Footwear on the Number of Hookworm-Carriers.** -*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1920. Pt. 8. pp. 120–131.

Investigations were made among the police at Sukabumi and their women and children living in the barracks to ascertain whether any conclusions could be derived therefrom as to the influence of footwear on the number of carriers. The women and children always go about barefoot. The young recruits had only been provided with shoes at the time of joining the ranks. A worm cure was administered and the stools were examined for two consecutive days. Of 417 recruits who had served for not more than one year, 81 per cent. were infected. These gave 16,199 worms, averaging 39 each. Of 200 police who had already served from 1–5 years, 70 per cent. were found to be carriers. From these 4,522 worms were expelled, averaging 23 per head. Of 130 police who had served from 5–7½ years, 31 per cent. were found to be infected; 3,342, or an average of 26, worms were expelled.

Of 173 women and children 68 per cent. were found to be carriers, with 4,090 worms, *i.e.*, on an average 40 per head.

The author concludes that the drafting of the senior men to other stations where hygienic control is often lacking explains the absence of any definite indication of the influence of footwear.

R. T. L.

SCHUURMANS STEKHOVEN, Jr. (J. H.), SCHUURMANS STEKHOVEN-MEYER (A. W.) & MAS SOERADJI. **Mijnwormbesmetting en bodeminfectie. Een onderzoek naar de verbreiding der anchylostomiasis, in verband met het voorkomen van mijnwormlarven in den bodem, Wonogiri, Residentie Solo.** Hookworm Infection and Pollution of the Soil.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 6. pp. 680–736. With 1 text fig.

The spread of hookworm infection in some villages of Wonogiri (Middle Java) is discussed at considerable length. Much theory is produced on the relation between the number of eggs in faeces, the haemoglobin percentage of the carriers and the probable number of worms harboured, but there is no control by worm-cures to confirm the authors' views. Their calculations are based upon single examinations, whilst they quote cases in which the number of eggs in the stools varied considerably from day to day.

The loss of nutrition is considered to play an important auxiliary rôle in the causation of the disease.

A description is given of the villages under report in view of the breeding places of the hookworm. Samples of the soil were taken in different places and examined for larvae by Baermann's test.

General worm-cures and sanitary measures are suggested for the worst infested village. The possibility or impossibility of combating hookworm disease in Javanese villages could be proved in this way.

W. J. Bais.

RODENWALDT (E.) & RÖCKEMANN (W.). **Zur Biologie von** *Oxyuris vermicularis.*—*Cent. f. Bakt.* 1. Abt. Orig. 1921. June 28. Vol. 86. No. 5. pp. 421–424.

A case is cited in which young *Oxyuris vermicularis* larvae were found in the stools of a patient for 11 consecutive days. There are two possible explanations of this phenomenon: (1) the patient may have reinfected herself with an adult female worm and the developing larvae have passed straight through the gut on account of its abnormal pathological condition, or (2) development may have occurred in the intestine without the eggs first passing to the exterior. The first explanation is not probable, for during the 11 days no adult female was found in the stools and had the adult been ingested before examination the escaping larvae would have been more developed at the end of the time than at the beginning, which was not the case. If the eggs can develop into larvae in the large intestine it is probable that the grown larva does not normally find its way to the exterior but remains in the intestine, so that continual self-reinfection takes place.

R. T. L.

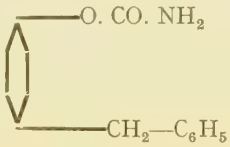
SCHICKHARDT (E.). **Butolan, ein neues Mittel gegen Oxyuriasis.** ["Butolan," a New Remedy for Oxyuriasis.]—*Muench. Med. Woch.* 1920. June 18. Vol. 67. No. 25. p. 722.

"Butolan," which is manufactured by Bayer & Co., is said to be chemically p-Benzylphenolcarbaminacidester. The author advises it as a cure for oxyuriasis, after using it on 26 cases in children of ages ranging from 2 to 12 years. The method adopted was as follows :—For three days 0·5 gm. "Butolan" was given two to four times daily (according to the age of the child), then with pauses of one or two days; the cure was repeated usually three times, and four times in very obstinate cases. Seven days after the complete course neither Oxyuris nor eggs could be found. After several months 22 out of the 26 children were still free from infection, though in the remaining 4 worms had reappeared. All the children stood the "Butolan" well, and even when bigger doses were given no harmful symptoms were noted either as regards intestines or kidneys. At the beginning of the course a laxative (calomel) was always given, and the anus was smeared with a mercurial ointment to prevent self-reinfection.

R. T. L.

FRANCKE. **Butolan, ein neues Anthelminthicum.**—*Med. Klinik.* 1920. July 22. Vol. 16. No. 29. pp. 754–755.

"Butolan" is a white, odourless and practically tasteless crystalline powder. It is insoluble in water, is easily taken even by small children, and causes no stomach or intestinal pains. It is the carbaminacidester of p-oxydiphenylmethane and has the following formula :—




In the body it breaks up into p-benzylphenol and carbaminacid. The former kills the oxyuris worms. It may be given in powders or tablets made up in 0·5 gm. The dose is one tablet three times daily for adults and older children, and for children under 10 years half a tablet three times daily. This dose is given on three consecutive days and is followed by a purgative. The writer has on several occasions given it for seven consecutive days, with a purgative on the 4th and 8th day. Adults can stand 1 gm. 3–4 times daily quite well, and this dose is recommended in severe cases. The cure may be accompanied by enemas, two of the most useful being a weak solution of aluminium acetate and onion water. Hygienic cleanliness must be strictly adhered to during the whole treatment. The results of this treatment have been excellent and seem to be permanent. Many of the children have been free of worms after the course of treatment from September to the following July; and only two of the author's patients have up till now proved refractory. The author has no doubt of the great value of "Butolan," although he realizes that it is still too soon to give a final opinion.

R. T. L.

SCHÜLE. **Ueber die Behandlung der Oxyuren mit "Butolan."** [Treatment of Oxyuriasis with "Butolan."]—*Med. Klinik.* 1920. Sept. 9. Vol. 16. No. 36. p. 927.

The firm of Bayer & Co. recently sent some of the new helminthicide, "Butolan," to the author; in the few cases in which it was tried recovery was so quick and thorough that the author is very hopeful that it may be of real value. The dose causes no unpleasant symptoms, even in children with a very sensitive stomach. So far it has not been possible to prove whether the cure is permanent or not.

R. T. L.

SELTER. **Zur Behandlung der Oxyuriasis.** [Treatment of Oxyuriasis.]—*Deut. Med. Woch.* 1921. July 7. Vol. 47. No. 27. pp. 778–779.

"Butolan," a "Karbaminsäureester" of p-Oxydiphenylmethane, is recommended as a vermicide lacking the usual unpleasant characteristics of these drugs. 0·2–0·5 gm. is given thrice daily for 2–3 days, followed by a purgative. The course of treatment is repeated a fortnight later. During this interval the usual precautions against reinfection are taken. Enemata are unnecessary. The preparation is now being made up in tablets of 0·5 gm., which can be broken into two portions for administration to children. Seventeen cases, aged from 1 to 15 years, were observed clinically. They remained free from Oxyuris for some months.

R. T. L.

OCHSENIUS (Kurt). **Zur Behandlung der Oxyuriasis.** [Treatment of Oxyuriasis.]—*Muench. Med. Woch.* 1921. June 24. Vol. 68. No. 25. p. 778.

The author uses as an anal ointment :—

| | |
|---|---|
| Anaesthesine .. .. .. .. .. | 2·0 gm. |
| Acid salicylici .. .. .. .. | 0·5 gm. |
| Vaselin or lanolin .. .. .. .. | 20·0 gm. |

It is well known that diet has an influence on oxyuriasis. Bulky vegetables, such as purées of swedes, are often given to induce a natural laxative action. When the faeces are loose more parasites are found in the rectum and anus, the worms becoming detached by the increased peristaltic action. If cocoa and chocolate with fresh fruits, jams and green vegetables are taken the worms apparently disappear at once. On the other hand, if the constipating elements are eliminated the worms are again seen. These facts have a practical value; theoretically they may explain the large increase of oxyuris during the war, due according to this, to the large quantity of vegetable stuffs eaten and the increased peristalsis resulting.

R. T. L.

FRANKE (Felix). **Zur Behandlung der Oxyuriasis.** [Treatment of Oxyuriasis.]—*Muench. Med. Woch.* 1922. Jan. 6. Vol. 69. No. 1. pp. 17–18.

For the last five years the author has ceased to use any internal remedy in the treatment of oxyuriasis with the exception of occasional use of Gelon aluminii subacet. He advises the following hygienic treatment: in addition to extreme personal cleanliness, continual

changing of bed-linen, cleaning and washing of bed-hangings and mattress, with beating and brushing of these in the open air where possible. Mercury ointment is to be used 2–3 times a day after evacuation, the anus being carefully washed before every application. Closed drawers must be worn day and night. Finally the finger-nails must be kept closely cut and well scrubbed. Where these precautions have been carefully carried out for a month the author has never found the cure to fail.

R. T. L.

BURNELL (Glen H.). "*Oxyuris incognita*" **in Australia.**—*Med. Jl. Australia.* 1921. Oct. 29. 8th Year. Vol. 2. No. 18. pp. 374–375. With 4 text figs.

The occurrence of the eggs of *Oxyuris incognita* in human stools was first recorded in Brisbane, Australia, in September, 1920, in two persons belonging to the same family. Further investigation has shown a total of 57 cases of infection out of 12,539 persons examined in Brisbane. As in America, the ova were found at a definite period of the year; between January 24 and April 18, 1921, 52 of these 57 cases occurred during the first four weeks, while the remaining five cases were noted during the next eight weeks. An attempt made to infect rabbits with the eggs yielded a negative result. The paper gives text-figures of the eggs and of the developing embryo retained within the shell.

R. T. L.

CALVIN (Joseph K.). **Native Infestation by the Broad Tapeworm,** *Diphyllobothrium latum.*—*Jl. Amer. Med. Assoc.* 1922. Jan. 14. Vol. 78. No. 2. pp. 84–85.

Notes of two cases of infestation in children born and living entirely in Chicago. In the first, a Jewish girl, the food consisted partly of fish coming mostly from Lake Michigan. In the second, some uncooked smoked fish was eaten during the winter; all other fish consumed was cooked. In neither case was there secondary anaemia.

R. T. L.

WALLACE (J. C.) & GRANT (Margaret). **Infestation by Broad Tapeworm.**—*Jl. Amer. Med. Assoc.* 1922. Apr. 8. Vol. 78. No. 14. p. 1050.

Native-born patients in Chicago harbouring *Dibothriocephalus latus* have been reported by CALVIN (see above). A case is described by the authors from Indiana. The blood examination showed 85 per cent. haemoglobin.

R. T. L.

ANDO (Akira) & ITO (Shiro). [**A Contribution to the Study of** *Dibothriocephalus latus.* **On** *Dibothriocephalus latus* **occurring in Man and Frog.**]—*Iji Shimbun* (*Med. News*). 1921. Dec. No. 1083. [Summarized in *Japan Med. World.* Tokyo. 1922. Apr. 15. Vol. 2. No. 4. p. 112.]

Frogs from a region where four cases of human Dibothriocephalus were found were nearly all infected with larval stages of this worm. When placed in tap water, distilled water or pond water, these larvae quickly died, but survived longer in milk and in saline solution, and

for a long time in Locke's and Ringer's solutions. The digestive fluid had little effect. The worm was able to survive 52 days in human serum. The larvae developed to mature worms both in the dog and the cat. Histologically and morphologically the larvae in man and in the frog were identical.

R. T. L.

HERZOG (Fr.). **Zur Kenntnis der Bothriozephalusänamie.** —*Muench. Med. Woch.* 1920. Nov. 26. Vol. 67. No. 48. pp. 1383–1385.

In this case of Bothriocephalus anaemia the blood showed the same constitution as in pernicious anaemia, but all other symptoms were lacking. Bothriocephalus anaemia must not be identified with pernicious anaemia and the composition of the blood must not be taken as the sole diagnostic symptom of the latter disease. Evidently the bone marrow reacts in the same way to different stimuli. In this case there was widespread pigmentation of the skin, which the author looks upon as haemochromatosis.

R. T. L.

BECKER (Gösta). **Versuche mit der Sachs-Georgi Reaktion an Bothriocephalusträgern.** [The Sachs-Georgi Reaction in Bothriocephalus Hosts.]—*Acta Med. Scandinavica.* Stockholm. 1922. Vol. 56. No. 4. pp. 453–460.

An extract was prepared by treating the washed Bothriocephalus with 90 per cent. alcohol for 24 hours, filtering the extract and allowing it to stand for another 24 hours, after which time the supernatant fluid was removed and allowed to stand for 24–72 hours, when no precipitation occurred. The clear crude extract was diluted with 90 per cent. alcohol and physiological saline and 1 per cent. of an alcoholic solution of cholesterin was added In the tests inactivated sera were employed and the results showed the antigen to be valueless since it reacted equally well with sera from parasitized and non-parasitized subjects.

R T. L.

CHOLODKOVSKY (N.). **Sur un nouveau parasite de l'homme.**—*Jl. Russe de Zoologie.* 1916. Vol. 1. No. 1. pp. 235–237. With 1 plate & 6 figs. [In Russian, pp. 231–234.]

The author creates a new species named *Dibothriocephalus minor* for a specimen passed, after treatment, by one of the members of an expedition sent from Russia to Transbaikalia. The strobila was about 10 cm. in length. The greatest breadth did not exceed 6 mm. The scolex was nearly quadrangular, blunt, and measured 1·5 mm. by 0·75 mm. There was no neck, the segments commencing immediately behind the scolex. Towards the posterior end the overlapping of the segments give the strobila a serrated margin. The uterus is apparent at 3 cm. from the scolex and has an irregular sac-like outline, not the characteristic rosette of *D. latus*. The eggs are oval, 0·07 by 0·04. This parasite is said to differ from *D. latus* and *D. cordatus* of man, also from *D. fuscus* and *D. serratus* of the dog and *D. felis* of the cat, by its shape and the size of the strobila and the structure of the scolex and uterus.

R. T. L.

HODSON (V. S.). **Tapeworm Hospitality.** [Correspondence.]—*Lancet.* 1921. Apr. 2. p. 728.

A patient in Khartoum Civil Hospital, treated once in the ordinary way with filix mas, has produced 31 specimens of *Taenia saginata.*

R. T. L.

CHANDLER (Asa C.). **Species of Hymenolepis as Human Parasites.**—*Jl. Amer. Med. Assoc.* 1922. Mar. 4. Vol. 78. No. 9. pp. 636–639.

It appears reasonable to the author that the very heavy human infestations with *H. nana* are the result of internal auto-infection. Recently JOYEUX has discovered cysticercoids in the intestinal villi of the European hedgehog, which apparently belong to the species commonly found in that animal. JOYEUX failed to infect rats with eggs from the human *H. nana,* and the author has had a similar experience. The evidence is in favour of the conclusion that rat and human parasites are distinct. It is presumed that *H. nana* has departed farther from the ancestral habits and has entirely lost the ability of developing in an intermediate host which its relative *H. murina* still retains. Three new cases of the occurrence of *H. diminuta* in the United States are recorded.

R. T. L

BURNELL (Glen H.). *Hymenolepis diminuta* **in Human Hosts.**—*Med. Jl. Australia.* 1922. Mar. 4. 9th Year. Vol. 1. No. 9. pp. 236–237.

During the Australian Hookworm Campaign 3 cases of *Hymenolepis diminuta* were noted in quick succession in children in Rockhampton. As only 12 cases of human infection are on record, the author considers it possible that infections with this parasite may have been attributed in many cases to *H. nana,* owing to the resemblance of their ova. The ova may be differentiated as follows :—

| *Hymenolepis diminuta.* | *Hymenolepis nana.* |
|---|---|
| " (*a*) The ovum has a definite greenish tinge, this being especially marked in the shell. | " (*a*) The ovum is almost colourless, what colour there is being a delicate pink. |
| " (*b*) Diameter : 65 $\mu$ to 70 $\mu$. | " (*b*) Diameter : 40 $\mu$ to 50 $\mu$. |
| " (*c*) Diameter of onchosphere roughly half that of the ovum. | " (*c*) Diameter of onchosphere, roughly two-thirds of that of the ovum. |
| " (*d*) The onchosphere has a small papilla and filaments are absent. | " (*d*) Papillae and filaments well marked. |
| " (*e*) Hooklets tend to be in the short axis of the onchosphere. | " (*e*) Hooklets tend to be in the long axis of the onchosphere." |

R. T. L.

FAIRLEY (K. Douglas). **The Results of an Analysis of Thirty-three Cases of Hydatid Disease of the Lung.**—*Med. Jl. Australia.* 1922. Apr. 1. 9th Year. Vol. 1. No. 13. pp. 346–355.

The 33 cases analysed in this paper were admitted to the Melbourne Hospital during the last twelve years. In 27 the affected site was the lower portion of the right lung ; in 2 at the apex of the right lung,

and in 4 the cyst occurred in the left lung. This remarkable distribution cannot be explained by any theory involving the passive migration of the embryo in the bloodstream. It seems probable that the embryo usually reaches the liver passively by the portal circulation. The right lobe of the liver is the part most frequently affected, and from here an active migration of the parasite would quickly bring it to the lower lobe of the right lung, where it is found so frequently. The distance from the liver through the diaphragm to the lung is less in children than in adults, and this may explain the relative frequency of pulmonary hydatid in the former.

The paper deals extensively with the physical signs and symptomatology of pulmonary hydatid disease. Haemoptysis was noted in 57·6 per cent. of the patients, dyspnoea in 27·3 per cent. Cough occurred in every case. Sweating, wasting and fever occur chiefly with suppurating or ruptured cysts. Differential diagnosis of varieties of lung infections simulating (*a*) hydatid of the liver, (*b*) phthisis, (*c*) malignant disease of the lung, (*d*) pleural effusion, (*e*) pneumonia, is fully discussed. Briefer reference is made to the value of X-rays and to biological aids to diagnosis. In regard to prognosis the author considers the immediate outlook good if operation is performed, but the later prognosis should be more guarded, as in 39·4 per cent. of the cases under review there was multiple infestation and in more than half further surgical procedure was required within a few years.

R. T. L.

FAIRLEY (N. Hamilton). **Researches on the Complement Fixation Reaction in Hydatid Disease.** *Quarterly Jl. of Med.* 1922. Apr. Vol. 15. No. 59. pp. 244–267.

——. **The Complement Fixation Test for Hydatid Disease and its Clinical Value.**—*Med. Jl. Australia.* 1922. Apr. 1. 9th Year. Vol. 1. No. 13. pp. 341–346.

An alcoholic extract of cyst wall was found to be inactive as an antigen for echinococcal infections; and similar extracts of *dried* hydatid fluid were not good. An extremely good antigen could be prepared by treating *moist* scolices with absolute alcohol and this extract was never found to give any pseudo-positive reactions. The author agrees with WEINBERG that the immune body appears in the serum owing to the filtration of hydatid fluid into the tissne.

R. T. L.

CAWSTON (F. G.). **Antimony in the Treatment of Lepers and Hydatid Disease.**—*Jl. Trop. Med. & Hyg.* 1922. Feb. 1. Vol. 25. No. 3. pp. 27–28.

In this paper on the treatment of leprosy with colloidal antimony the author mentions a case of hydatid cyst of the liver which he treated apparently successfully by intramuscular injection of 38 cc. of Crooke's colloidal antimony with 6½ gr. of emetine hydrochloride, the doses ranging from 2–9 cc. of colloidal antimony and the treatment extending over three weeks. The eosinophilia fell from 16 per cent. to 8 per cent. in four weeks from the commencement of treatment. While the first skiagram showed a definite cyst, only a faint shadow, such as was observable in a case operated on twelve years previously, remained after treatment.

R. T. L.

TREMATODES.

BRODEN (A.). **Un cas de bilharziose rectale chez l'Européen au Congo Belge.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. May. Vol. 1. No. 2. pp. 171–173.

CAWSTON (F. G.). **Bilharzia Infection in the Pool, the River, and the Lagoon.**—*Jl. Trop. Med. & Hyg.* 1922. Jan. 16. Vol. 25. No. 2. pp. 16–18.

CAWSTON (F. G.). **Bilharzia Disease in South Africa.** [Correspondence.]—*Brit. Med. Jl.* 1922. June 17. p. 975.

DOLLFUS (Robert Ph.). **Sur la présence en France et en Corse du** *Bullinus contortus* **(Michaud), hôte intermédiaire de** *Schistosoma haematobium* **(Bilharz). Note préliminaire.**—*Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 208–212.

HERMITTE (L. C. D.). **A Case of Bilharziasis cured by Tartar Emetic administered Intravenously.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Nov. 17 & Dec. 15. Vol. 15. Nos. 5 & 6. pp. 198–201.

MILTON (Frank). **Measurement as the Basis of Diagnosis of the Furcocercous Cercariae.**—*Indian Med. Gaz.* 1922. May. Vol. 57. No. 5. pp. 161–164.

VOGEL (R.). **Ueber das intra vitam beobachtete Vorkommen des grossen Leberegels** (*Fasciola hepatica* **L.) bei einem Kinde.**—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Jan. 31. Vol. 87. No. 7–8. pp. 556–557.

CESTODES.

BAUJEAN. **Un cas de parasitisme multiple par** *Taenia saginata.*—*Bull. Soc. Méd. Chirurg. française de l'Ouest-Africain.* 1920. July. Vol. 2. No. 7. p. 197.

BECKETT (T. G.). **The Treatment of Hydatid Disease.** [Correspondence.]—*Med. Jl. Australia.* 1922. Jan. 7. 9th Year. Vol. 1. No. 1. p. 27.

CORVETTO (Anibal). **Equinococia pulmonar.**—*Cronica Med.* 1922. Jan. Year 39. No. 703. pp. 3–8.

MEI (A.). **Echinococcus Disease in Cyrenaica.**—*Arch. Italiano di Chirurgia.* Bologna. 1921. Oct. Vol. 31. No. 10. p. 455. [Summarized in *Jl. Amer. Med. Assoc.* 1922. Mar. 4. Vol. 78. No. 9. p. 690.]

TABOADA (Teodoro M.). **Curación de la ascitis en un caso de hepatocirrosis de Laennec, con hidatidosis hepática encontrada en la autopsia.**—*Cronica Med.* Lima. 1921. Sept. Vol. 38. No. 699. pp. 296–298.

NEMATODES.

BERTRAM (H.). **Circulus durch Askariden.**—*Zentralbl. f. Chirurg.* Leipzig. 1921. Aug. 20. Vol. 48. No. 33. pp. 1187–1188.

FÜLLEBORN. **Ueber Infektionsversuche mit Toxascaris.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1922. Vol. 26. No. 2. pp. 59–60.

DE GIRONCOLI (Franco). **Ascaridi lumbricoidi in un' ernia crurale strozzata.**—*Riforma Med.* 1922. Jan. 30. Vol. 38. No. 5. pp. 102–104.

GRAHAM (E. N.). **The Round Worm in Surgery.**—*Indian Med. Gaz.* 1921. Dec. Vol. 56. No. 12. p. 457.

INGRAM (A.). **Perforation of the Ileum probably caused by** *Ascaris lumbricoides.*—*Jl. Trop. Med. & Hyg.* 1922. July 1. Vol. 25. No. 13. pp. 211–212. With 1 text fig.

LEFEBVRE (Ch.) & BAILLAT. **A propos des complications chirurgicales de l'ascaridiose (accidents post-opératoires).**—*Presse Méd.* 1922. July 19. Vol. 30. No. 57. pp. 612–613.

NEUDÖRFER (Arthur). **Ueber Askaridiasis der Gallenwege.**—*Wien. Klin. Woch.* 1922. Feb. 23. Vol. 34. No. 8. pp. 179–180.

PATTERSON (Harold A.). **Experiences with Hookworm.**—*Milit. Surgeon.* 1922. May. Vol. 50. No. 5. pp. 562–569.

RUIZ ARNAU (Ramón). **Filariosis en su relacion con otras Linfopatias tropicales.**—*Bol. Assoc. Med. de Puerto Rico.* 1922. June 30. Vol. 16. No. 137. pp. 95–100.

STRATER (P.). **Operativ geheilter Fall von Askaridenileus.**—*Zentralbl. f. Chirurg.* Leipzig. 1921. Aug. 20. Vol. 48. No. 33. pp. 1188–1189.

WALLACE (H. E.). **Hookworms.**—*China Med. Jl.* 1922. Jan. Vol. 36. No. 1. pp. 71–73.

UNCLASSED.

DE ALMEIDA (Junior) (Theophilo). **O chenopodio e a sua toxidez.**—*Brazil Medico.* 1922. June 17. Year 36. Vol. 1. No. 24. pp. 324–326.

LEITE (Raul). **O oleo essencial de chenopodio e sua toxidez.**—*Brazil Medico.* 1922. June 24. Year 36. Vol. 1. No. 25. pp. 340–341.

LELLIS (Areobaldo). **O chenopodio e a sua toxidez.**—*Brazil Medico.* 1921. Nov. 19. Year 35. Vol. 2. No. 19. pp. 287–289; and 1922. Apr. 1. Year 36. Vol. 1. No. 13. pp. 157–159.

ONORATO (Raffaele). **Un caso di morte per avvelenamento da tartaro emetico.**—*Arch. Ital. Sci. Med. Colon.* Tripoli. 1921. Mar.–Apr. Vol. 2. No. 3–4. pp. 33–53.

PEQUENO (Junior) (Pio Alves). **O chenopodio e sua toxidez.**—*Brazil Medico.* 1922. Apr. 15. Year 36. Vol. 1. No. 15. pp. 185–186.

## AMOEBIASIS AND DYSENTERY.

### Amoebiasis.

Stiles (C. W.). **The Public Health Status of Amoebic Dysentery in the United States as potentially influenced by the World War.**—*Boston Med. & Surg. Jl.* 1922. Mar. 23. Vol. 186. No. 12. pp. 377–379.

This paper refers to the microscopic examination of 13,043 faecal specimens from 8,029 persons in 48 institutions, located in 22 States and the District of Columbia. Of these persons 39·9 per cent. (3,208) showed protozoa and 9·6 per cent. (775) worms; 333 persons (4·1 per cent.) showed infection with *Entamoeba histolytica*. Of 196 immigrants at Ellis Island 8·6 per cent. (17) were infected. Of 329 American boys and girls in a training school in Columbia 17·3 per cent. were found infected as a result of 5·2 examinations per case. Of 1,547 civilians 8·3 per cent. (129) were in a similar condition, indicating a probable total infection of 13–17 per cent. Of 83 American boys and girls in another training school in Columbia an average of 5·5 examinations per case revealed 12 per cent. (10) as infected. Of 2,584 soldiers who did not go to Europe, an average of 1·3 examinations showed 3·5 per cent. (93 cases) infected, indicating a probable total of 8–9 per cent. Of 3,536 soldiers who returned from Europe, an average of 1·1 examinations per case revealed 2·8 per cent. (100) as infected, thus indicating a total of 7·8–9 per cent. Of 362 persons of unknown military history 1·5 examinations per case uncovered 3 per cent. (11) as infected, indicating a total of 9 per cent.

The conclusion would seem justified that on an average the soldiers who had served in Europe were not infected with amoebic dysentery any more than are certain other elements of the population. It is clear then, that no large expenditure of money with the object of searching out and treating infected individuals is justifiable. As far as the rates of infection are concerned, it is safe to concede the point that they are higher than was conceived to be possible before the war, but, as far as the significance of the figures is concerned, we must revise former conceptions and must conclude that the "carrier" of amoebic dysentery is not a great menace to his neighbours.

The intensive studies on intestinal protozoa conducted during and since the war bring out clearly two practical facts:—

(1) At least in temperate climates, the intestinal protozoa of man are by no means of so much clinical importance as has been assumed. The average case of infection is usually of such slight importance from a clinical point of view that it can be ignored. A routine examination for intestinal protozoa or helminths is not called for in every case of disease; on the contrary, it is only in tropical and sub-tropical localities that the expense can be justified as a matter of administration; in northern localities, this examination should in general depend on symptoms.

(2) At least in temperate climates, *Entamoeba histolytica* is not usually a serious parasite, and its presence in healthy carriers is common. This is not to be interpreted as meaning that it is not a serious menace in the tropics and sub-tropics. Probably no person would question the seriousness of amoebic dysentery in the Southern States.

P. H. Manson-Bahr.

ELLIS (Aller G.). **Amebiasis.**—*Bulletin of the Ayer Clinical Laboratory of the Pennsylvania Hospital.* Philadelphia. 1922. May. No. 7. pp. 7–56. With 8 figs. in text.

In his introductory remarks the author says that "the time . . . appears opportune for a brief statement of salient points about the pathogenic ameba and its effects on the human body": and he therefore sets out to give "a review of the subject," together with a "report of twenty-three cases of amebic dysentery personally studied post mortem in Bangkok." These cases are, he believes, the first to be described in detail from Siam.

In his preliminary review the author discusses the geographical distribution of amoebiasis; the intestinal amoebae of man; the lesions caused by *E. histolytica*; the diagnosis and treatment of amoebic dysentery; amoebic abscess of the liver, and other lesions of secondary amoebiasis. Although 93 other works are referred to, the author's study of the literature appears to have been by no means exhaustive; and his discussions are often marred by his impartiality—truth and error, good work and bad work, being set down side by side as though they were all equally worthy of credence and respect. [It seems to the reviewer that uncritical compilation of this character no longer serves any useful purpose.] Many of the author's statements are, moreover, open to very serious criticism. For example, it is alleged that amoebiasis has spread recently from the tropics to other parts of the world (p. 7), and the references to recent English work (pp. 8, 9) contain several important mistakes. [The observations here attributed to YORKE are those of MALINS SMITH and MATTHEWS, and the opinion attributed to the Medical Research Council is in reality that expressed by the present reviewer. The author seems to have completely misunderstood the significance of much of the work done on intestinal protozoa in England during the War.] On pp. 24 25 the author tells us that "the diagnosis of *E. histolytica* . . . . practically resolves itself into distinguishing between the *histolytica* and *coli*": while the suggestion (p. 25) that "if entamebae are in numbers in the stools of a person having acute or subacute dysentery, for purposes of diagnosis they should be regarded as the histolytica" he calls "a very practical conclusion." The section on treatment is deficient in many ways; and as most of the English work carried out during the War is ignored, it can hardly be regarded as the last word on the subject. From these and other omissions and imperfections it seems clear that the author, in his "review," has no message to deliver to readers of this *Bulletin*.

Although the "review" occupies about 32 pages, and the description of cases less than half this number, the latter section is, nevertheless, the more valuable of the two. The 23 cases comprised 13 males and 10 females, but unfortunately their nationality is not explicitly stated (? Siamese). Amoebic abscess of the liver was found in four; but the most noteworthy observation relates to the involvement of the small intestine—no less than nine cases out of the 23 showing lesions in the ileum. The author says "I believe that in all nine cases the lesions were amebic, though amebae were actually found in only two of the five cases studied microscopically": and it is thus permissible to doubt whether his interpretation was always correct more especially as no bacteriological study of these cases appears to have been made. It is contrary to the experience of other workers to find the small bowel involved in so large a proportion of cases (40 per cent); and the author's conjectures that "*E. histolytica* is more active in Siam" than

elsewhere, or that "the people there are less resistant," seem scarcely adequate to explain his conclusions—as he himself appears to allow. On an earlier page (p. 28) he notes that he was unable to find Charcot-Leyden crystals in the stools of any of his patients. Apart from these observations the cases yield no information which has not been recorded many times before.

Clifford Dobell.

HAGE. **Zur Frage des Vorkommens autochthoner Amöbenruhr in Deutschland (nach Stuhluntersuchungen in Thüringen).** [Occurrence of Autochthonous Amoebic Dysentery in Germany (based on Stool Examinations in Thuringia).]—*Cent. f. Bakt.* 1. Abt. Orig. 1922. Apr. 13. Vol. 88. No. 2. pp. 107–113.

This paper is replete with tables, and records systematic stool examinations of 400 people from all parts of Thuringia as follows :—

| — | Number of persons examined. | Number infected with protozoa. | | Number infected with helminths. | |
|---|---|---|---|---|---|
| Children ♂ .. | 34 | 4 | 11·8 per cent. | 2 | 6 per cent. |
| Children ♀ .. | 40 | 4 | 10 ,, | 3 | 7·5 ,, |
| Adults ♂ .. | 160 | 63 | 39·4 ,, | 8 | 5 ,, |
| Adults ♀ .. | 166 | 64 | 39 ,, | 16 | 9·6 ,, |
| Total .. | 400 | 135 | 33·8 ,, | 29 | 7·3 ,, |

| — | | Protozoa. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Amoebic Cysts. | | | | | | | | Flagellate Cysts. | | | | Protozoa of all kinds. |
| | | *E. histolytica.* | | *E. coli.* | | Iodamoeba. | | Limax type. | | *Trichomonas intestinalis.* | | *Lamblia intestinalis.* | | |
| | | | per cent | | per cent | | per cent | | per cent | | per cent | | per cent | |
| ♂ Children | 34 | – | – | 3 | 8·8 | – | – | – | – | – | – | 1 | 2·9 | — |
| ♀ Children | 40 | – | – | 4 | 10 | – | – | – | – | – | – | – | – | — |
| ♂ Adults | 160 | 2 | 1·3 | 55 | 34·4 | 10 | 6·3 | – | – | 4 | 2·5 | 7 | 4·4 | 7 |
| ♀ Adults | 166 | 1 | 0·6 | 62 | 37·3 | 8 | 5·0 | 1 | 0·6 | 5 | 3 | 6 | 3·6 | 8 |
| Total | 400 | 3 | 0·8 | 124 | 31 | 18 | 4·5 | 1 | 0·3 | 9 | 2·3 | 14 | 3·5 | — |

An attempt was made to differentiate, as regards their liability to infection with protozoa, between town and country dwellers; the difference is not a great one, but by far the highest proportion—44 per cent.—was found in lunatics.

76 inhabitants of one village were likewise examined :—

| — | | *E. histolytica.* | | *E. coli.* | | Iodamoeba. | | Limax amoeba. | | *Trichomonas intestinalis.* | | *Lamblia intestinalis.* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | per cent. | | | | | | | | |
| Children .. | 32 | — | — | 6 | 18·7 | — | — | — | — | — | — | — | — |
| Adults .. | 44 | — | — | 12 | 27·3 | — | — | — | — | — | — | — | — |

Six families, consisting of 18 persons, all in good health and belonging to the working class, were also subjected to the same thorough investigation. In persons so closely associated as these people are a relatively high infection with *E. coli* (55·5 per cent.) and Iodamoeba (33·3 per cent.), *Trichomonas intestinalis* (16·6 per cent.), *Lamblia intestinalis* (16·6 per cent.) was revealed.

Of the persons infected with *E. histolytica* prolonged enquiries elicited the fact that in all but one the original infection was probably contracted outside Germany. There was one autochthonous case.

P. H. M-B.

FRANCHINI (Filippo). **Amebiasi nella provincia di Bologna.—I. Dissenteria amebica nell'uomo.** [Amoebic Dysentery in Man.]—*Pathologica.* 1921. Nov. 1. Vol. 13. No. 311. pp. 529–544. With 1 plate.

The author states that he reported an epidemic of amoebic dysentery in the province of Bologna in Italy in 1919. A second was noted in 1920 in Capofiume in the same province, and during it he examined 18 cases. He states that there was a simultaneous outbreak amongst cats, which he proved to be due to the dysentery amoebae.* There then follows a long dissertation on the characters of the amoebae as seen by him and a comparison of his own observations with those of other observers. Taking into account the admitted fact that stools did not reach him till at least twelve hours after they had been passed, as he was working 40 kilometres away from the epidemic, it is perhaps not surprising that he should have produced a plate of 53 figures hardly any one of which can be recognized as an amoeba at all. That any observer should have considered it worth while to illustrate a work with such drawings at the present time is surprising and leads one to hesitate in accepting statements as to the nature of the epidemic in human beings and cats. It is extremely probable that *E. histolytica* infections are endemic in Italy and that cases of actual amoebic dysentery occur fairly frequently, but to style the small series of cases seen by him an epidemic seems hardly logical. It seems perfectly clear that the author has little, if any, knowledge of the human intestinal amoebae.

C. M. Wenyon.

* FRANCHINI (F.). Dissenteria amebica spontanea nel gatto concomitante ad una circoscritta epidemia di dissenteria nell'uomo in una comune del Bolognese. Nota preventiva.—*Giorn. di Clinica Med.* Bologna. 1920. Sept. Vol. 1. No. 9. pp. 352–353.

i. DREYER (F. J. F.). **Tilfælde af Amöbedysenteri.** [Case of Amoebic Dysentery.]—*Hospitalstidende.* Copenhagen. 1920. Oct. 6. Year 63. No. 40. Medicinsk Selskab for Fizens Stifts Forhandlingar. pp. 17–19.

ii. HANSEN (I.). **4 Tilfælde af Amöbedysenteri behandlet med Emetin.** [Four Cases of Amoebic Dysentery treated with Emetine.]—*Ugeskrift for Læger.* 1921. Dec. 8. Vol. 83. No. 49. pp. 1625–1633.

i. This is a short account of a case of amoebic dysentery observed in a patient in a Danish hospital—a sailor of 24, who had contracted the disease in China. It appears to have been a typical case, presenting no unusual features. The stools were bacteriologically negative, and contained numerous active amoebae with ingested red corpuscles. The patient was treated with emetine, silver nitrate injections (intra-rectally), and tannin (rectally and subcutaneously).

ii. A short paper recording four ordinary cases of amoebic dysentery seen in a hospital at Copenhagen. The patients contracted dysentery, respectively, in Canton, the West Indies, Africa, and Teneriffe, and they were all, therefore, evidently relapse cases—not indigenous Danish cases of amoebic dysentery. They all cleared up under emetine treatment, but none of them remained under observation for any length of time afterwards.

According to the author of this paper, these four cases and that of DREYER (i, *supra*) are the only cases of amoebic dysentery recorded up to the present in Denmark.

Clifford Dobell.

SPOLVERINI (L.). **Sulla dissenteria amebica infantile.**—*La Pediatria.* 1922. Jan. 1. Vol. 30. No. 1. pp. 1–11.

Many practitioners, well acquainted with amoebic dysentery in adults, overlook the condition in children in the belief that those of tender years are not subject to the disease. Several cases, however, of enterocolitis in children in the hot season have proved to be amoebic dysentery. The likelihood of erroneous diagnosis was all the greater in that in some parts of Italy amoebic dysentery had not been met with until the return of soldiers in the late war.

Five cases, of ages from 2½ to 12 years, are recorded in detail; four of these had been diagnosed and treated for a long time as enterocolitis. Examination of the stools was then carried out and the *Entamoeba histolytica* discovered. Specific treatment with emetine led to a rapid clearing up of the condition. In the remaining case more than one course was necessary. There is nothing calling for special remark, the cases being quite straightforward.

H. H. Scott.

FERRO (Paolo). **Sulla dissenteria amebica.**—*Giorn. di Clin. Med.* Parma. 1921. Feb. 10. Vol. 2. No. 3. pp. 81–86.

Three cases are reported of atypical amoebic dysentery and a fourth case of chronic amoebic dysentery which, after treatment for 30 months with dieting and astringents, was cured by three series of emetine injections of 1·02 gm. (in 10 days), 0·72 gm. (in 7 days), and 0·54 gm. with intervals of 10 and 14 days between the series.

In discussing the diagnosis of amoebic dysentery the writer lays especial stress on the importance of the search for vegetative forms of the amoeba in fresh stools diluted with tepid sterile salt solution. He mentions with approval the method of radioscopic examination with the aid of artificial pneumothorax in fixing the site of liver abscess. This method was recently described by IZAR (*Radiologia medica*, 1921).

J. Rosslyn Earp.

LICHTENSTEIN (A.). **Therapeutische Schwierigkeiten bei der Amoebiasis des Darmkanals.** [Therapeutic Difficulties in Amoebiasis.]—Reprinted from the *Verhandlungen des 4en Kongresses der "Far Eastern Assoc. of Trop. Med."* 8 pp. Weltevreden: Javasche Boekhandel en Drukkerij Rijswijk.

In this paper recent methods of treating amoebiasis are passed under review. The author speaks highly of neosalvarsan in this condition, both when given intravenously (course totalling 2·1 gm.) and when swallowed in cachets; in the latter case there is, of course, the danger that the capsules will be passed through the intestinal tract unchanged. He believes that this method will remain as the "*ultimum refugium*" in amoebiasis. He also believes in *Oleum chenopodii*, but in neither instance is he able to do more than generalize.

P. H. M-B.

WATCH (N. B.). **Amoebic Dysentery in New Guinea.** [Correspondence.]—*Med. Jl. Australia.* 1922. June 3. 9th Year. Vol. 1. No. 22. p. 621.

In the medical report of German New Guinea for the year 1909–10 there were 109 cases of *Entamoeba histolytica* infections reported. Since there is some doubt in Australia as to the existence of amoebic dysentery in New Guinea, a typical case is recorded.

P. H. M-B.

SMITH (J. Forest). **Solitary Abscess of the Liver.**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Dis. & Parasit.). 1922. Apr. Vol. 15. No. 6. pp. 24–26.

This paper embodies an investigation of cases of solitary abscess of the liver treated in St. Thomas' Hospital during the last 25 years.

In 1920 a child, aged 5, was admitted with a history of passage of blood and mucus *per rectum* at first thought to be the result of intussusception. Examination of the faeces revealed *Entamoeba histolytica* in numbers. The child recovered on emetine bismuth iodide. The possible source of infection was an uncle, living in the house, who had recently returned from war service in the east, where he had contracted dysentery.

The series is divided into two groups: the first consists of 29 cases in which a history is given of residence in countries in which amoebic dysentery is endemic; the second group contains 3 persons, none of whom had been abroad.

In the first group the majority admitted previous dysentery; 3 had been previously treated for liver abscess. Up to the year 1909 there had been 15 cases with 10 deaths, whilst from 1910 to 1921 there were 14 cases with only 1 fatal result. Two cases are described as "resolution by expectoration." In one fatal case, in which at post-mortem examination a track from an abscess in the

right lobe to the right bronchus was shown, amoebae had been found in the sputum. In one case the occurrence of severe pain in the right lumbar region intensified by exertion led to exploration. Sixteen days later the patient died suddenly from pulmonary embolism and the cause was found to be a solitary abscess of the liver. The provisional diagnoses are of interest. One was sent in as a cirrhosis, whilst empyema, pleural effusion and unresolved pneumonia were common errors.

Of the second group one apparently was a true amoebic abscess, as follows :—

A woman, aged 25, was admitted in 1920 with a history of hepatic pain and emaciation. Fever of a hectic type was present. The abscess was opened and drained ; the pus, chocolate in colour, was sterile on culture. The patient had always resided in England and her husband was an ex-soldier who had had dysentery during the war.

In the other two the etiology was suggestive, but by no means so certain ; one was a boy of 13, the other a man aged 26, in whom the illness proved fatal.

P. H. M-B.

MIGINIAC. **Deux observations d'abcès du foie ouverts dans les bronches. Drainage transcostodiaphragmatique. Traitement complémentaire par l'émétine. Guérison.**—*Bull. et Mém. Soc. Chirurg. de Paris.* 1921. Dec. 27. Vol. 47. No. 34. pp. 1414–1422.

This paper deals with interesting clinical records of two cases of indigenous amoebiasis in France.

The first case, a woman of 50 years of age, lived in Toulouse and had never been abroad. She suffered from diarrhoea, pyrexia, pain in the right hypochondrium and right shoulder joint ; she was emaciated and slightly icteric. Expectoration and vomiting of abundant brown-coloured pus took place suddenly. Dulness at the right base suggested an empyema, and by means of Potain's aspirator deeply situated thick chocolate-coloured pus was drawn off—about a litre in amount. The pleura was explored and the ninth rib resected, but no pus was found. Convalescence was retarded by cardiac troubles and oedema of the lower limbs, but on emetine injections all symptoms ceased and within a month the wound closed.

The second case also hailed from Toulouse and had never been abroad. The liver was very much enlarged and the signs similar to the first case. Thick chocolate-coloured pus was being expectorated. Exploratory puncture revealed a small abscess beneath the twelfth rib. The eleventh rib was resected in the scapular line. On emetine injection the wound cavity rapidly healed and the patient left the hospital on the 16th day after operation. The remainder of the paper consists of a résumé of the minutiae of technique and the rationale of emetine treatment.

P. H. M-B.

MIGINIAC (Gabriel). **La vomique dans les abcès amibiens du foie. Pronostic et traitement.**—*Rev. de Chirurg.* 1922. Vol. 41. No. 2. pp. 100–130.

This is a lengthy discussion summarizing the statistics published by many observers, for the most part French, on rupture of liver abscess into various organs. The text is based upon the author's two indigenous cases reviewed above. It is quite unnecessary to recite in

this summary well-known statistics compiled by BERTRAND and FONTAN, ROGERS in Calcutta, GRALL, and others. The following conclusions are arrived at :—

In certain rare cases rupture of an hepatic abscess into a bronchus is to be regarded as advantageous, and therefore surgical intervention should be withheld.

In the majority of instances intrapulmonary rupture is a grievous accident, for it may produce asphyxiation, rendering emergency operation imperative ; at other times it may produce chronic pulmonary trouble, simulating tuberculosis or chronic malaria and necessitating an operation for drainage purposes.

Expectoration of liver pus may reveal a hitherto unsuspected hepatic abscess, and therefore indicate operation and drainage of that abscess. The operation must be performed according to the accepted standards, in the same manner as if no rupture had taken place. Generally this is quite sufficient to stop purulent expectoration. Emetine injections are most valuable and should never be neglected.

P. H. M-B.

FRY (A. Sargood). **Two Cases of Tropical Abscess of Liver Rupturing into the Abdomen.**—*Indian Med. Gaz.* 1922. Apr. Vol. 57. No. 4. pp. 135–137.

The first case presented many difficulties in diagnosis. There was a history of prolonged illness and signs of acute peritonitis, which it seemed probable was due to rupture of a liver abscess. At autopsy a retro-colic abscess which discharged the estimated quantity of 6 pts. of pus was found connecting with a large cavity, the size of a coconut, in the right lobe of the liver. No liver substance remained above or posteriorly to this cavity, which extended downward, so as to involve the upper half of the right kidney.

The second case, a European, presented various obscure abdominal symptoms with hiccough, and died suddenly from collapse. At autopsy an abscess of the left lobe of the liver was found to have ruptured downward, in the neighbourhood of the pylorus, into the general peritoneal cavity.

These two cases presented a remarkable difference in their respective periods of symptomatic warning. In the first some 9 months elapsed during which a diagnosis might have been made, whereas in the second the patient became aware that he was ill only some 20 days before death.

P. H. M-B.

ENNEKING (J.). **Een geval van beginnend leverabsces na een Hollandshe amoeben-dysenterie.** [Case of Commencing Liver Abscess after Amoebic Dysentery contracted in Holland.]—*Nederl. Tijdsch. v. Geneesk.* 1921. Mar. 19. Vol. 65 (1st half-year). No. 12. pp. 1579–1581.

The author emphasizes the importance of an examination for the presence of *E. histolytica* (or its cysts) in the stools of patients suffering from colitis with blood and mucus, even in persons who have never been in the tropics. A striking feature of these "autochthonous" amoebiases is the great rarity of liver abscesses, as was pointed out by CARLES of Paris in 1918. The author's own case was that of a

man of 25 who in 1913 developed colitis with frequent stools (15–25 per day) containing a good deal of blood and mucus. Not until 1918 were the stools examined for *E. histolytica*, when active forms were found. Emetine treatment was apparently successful, but in 1919 there was a recurrence of the symptoms. A second course of treatment with emetine was again successful, but five months later the patient became suddenly ill with high temperature, pain in the liver region, chest and back. There was again rapid improvement on emetine treatment. [Though the author is well advised in again directing our attention to the occurrence of amoebic dysentery in persons who have never been in tropical countries, his conclusion that the case was one of commencing liver abscess is not quite convincing.]

T. Joekes.

LENOBLE (E.) & JEGAT (Y.). **Un cas de dysenterie amibienne chronique avec abcès du foie guéri par l'émétine.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Apr. 13. 3rd Ser. Year 38. No. 13. pp. 595–598.

In this case the amoebic origin of the dysentery and consequent hepatic abscess were amply verified by the discovery of *E. histolytica* in the stools and in the liver pus obtained by exploratory puncture. The therapeutic action of emetine was evident in the rapidity with which the patient recovered. Within 24 hours the stools had improved; similarly the hepatic pains disappeared rapidly within the space of a very few days.

The emetine injections were given in three series, each lasting five days, 8 cgm. of emetine being injected daily.

P. H. M-B.

LAPORTE (F.) & ROQUES (E.). **Fièvre du type ondulant au cours d'une hépatite amibienne. Guérison par le chlorhydrate d'émétine.** —*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Apr. 13. 3rd Ser. Year 38. No. 13. pp. 603–608. With 3 charts in text.

This paper records an interesting case of prolonged fever giving a temperature chart of a peculiar remittent type, resembling that of undulant fever. It was observed for four months and the patient minutely investigated before the real cause of the malady was recognized.

The patient eventually developed an enlarged and painful liver. An X-ray examination suggested definite enlargement of the right lobe; stool examination was negative. The condition rapidly improved and the fever subsided after injections of emetine. Search through the literature failed to reveal a parallel case.

P. H. M-B.

FALZI (Ormisda). **La cura medica nell' ascesso epatico da ameba.** [Amoebic Abscess of the Liver treated medically.]—*Policlinico.* Sez. Prat. 1922. May 15. Vol. 29. No. 20. pp. 648–651. With 1 chart in text.

Whereas a short time ago amoebic abscess of the liver was regarded as curable only by surgical means, and later the employment of emetine was recommended in addition to operative measures, the

author now holds that in whatever stage the condition may be (not merely in the presuppurative stages) an intensive emetine treatment may suffice and should be tried.

The patient, a male, aged 29 years, gave a history of "muco-sanguineous enterocolitis" in 1915. He passed 30–40 motions daily and was ill for a month. In 1918 he passed blood and mucus in which the *E. histolytica* was found. He was given six injections of emetine with good results. During the succeeding nine months he had vague pains over the front of the liver and in the right shoulder. In June, 1919, the diarrhoea returned and the pain increased. There was intermittent fever, enlarged and tender liver and enlarged spleen. Six months later he was pale, wasted, and a little jaundiced. There were physical signs indicative of liver abscess, confirmed by exploration. He was given on four successive days 9, 12, 3 and 9 cgm. of emetine hydrochloride. The reduction on the third day was owing to the onset of vertigo and dyspnoea. After the third injection the temperature fell to normal, and there was immediate improvement in the general condition and gradual diminution of the main clinical signs of abscess, confirmed by radioscopic examination. During the succeeding 45 days the patient put on 17 lb. in weight. It is proposed to repeat the emetine treatment periodically to prevent relapse.

H. Harold Scott.

WIDAL (F.), ABRAMI (P.) & HUTINEL (J.). **Recherches sur l'insuffisance protéopexique du foie dans l'hépatite dysentérique.**—*C.R. Acad. Sci.* 1922. Feb. 6. Vol. 174. No. 6. pp. 351–355.

Having discovered a new function of the liver, the authors propose to utilize the knowledge gained in the diagnosis of hepatic conditions. This function the authors have described as the "proteopexic function," and by its utilization it is possible to detect the least alterations in the gland. The test consists of the presence or absence of a "haemoclasic crisis" [see this *Bulletin*, Vol. 14, p. 273], estimated at frequent intervals subsequent to the ingestion of 200 gm. of milk. Frequent leucocyte counts are made and the leucocytosis is taken as an index of the completeness or otherwise of protein metabolism. This test can be utilized as a means of estimating the influence of amoebic invasion of the liver upon this function. In the first place it was necessary to determine that intestinal amoebiasis without hepatic derangement did not provoke a "haemoclasic crisis" after ingestion of milk. In a case of presuppurative hepatitis whose urine contained a trace of urobilin the ingestion of milk caused a rise in the total leucocytes of 15 to 18,000. Three other cases with actual abscess formation were also investigated, one was operated upon and 250 gm. of pus evacuated from the left lobe. The urine contained urobilin and the "haemoclasic crisis" tested on the morning of the operation indicated that the proteopexic function of the liver was undisturbed; in a second and third case the result was similar, a rise of leucocytes of 18 to 21,000 being observed.

Now it appears that, even when considerable destruction of the glandular tissue has taken place as a result of suppuration, the action of the *E. histolytica* is so local that the functions of the liver as a whole are undisturbed; the toxins of the amoeba act locally and are not widely diffused. The authors have already proved, so they claim, that, of all the substances which exercise a profound effect upon the proteopexic functions of the liver, the arsenobenzene derivatives, notably novarsenobillon, occupy the first place. In certain subjects after administration of these compounds it has been noted that in

addition to the " haemoclasic crisis " urobilin appears in the urine and Hay's test becomes positive. They note with interest that in one particular case of amoebic abscess the injection of 1·65 gm. of novarsenobillon failed to provoke a haemoclasic crisis, while a much smaller amount did so in the case of a normal liver. The results obtained in liver abscess are to be contrasted with those obtained in diffuse intoxications, such as infectious jaundice and toxaemias of circulatory origin.

P. H. M-B.

Ely (L. W.), Reed (A. C.) & Wyckoff (H. A.). [**Ameba as Cause of Second Great Type of Chronic Arthritis.**]—*California State Jl. Med.* San Francisco. 1922. Feb. Vol. 20. No. 2. p. 59. [Summarized in *Jl. Amer. Med. Assoc.* 1922. Mar. 4. Vol. 78. No. 9. p. 682.]

A relationship of the *E. histolytica* to osteoarthritis is actually suggested in this paper. It is *claimed* that in paraffin sections of the bone in the region of necrotic areas numbers of *E. histolytica* could be demonstrated in the vicinity of the bone capillaries.

P. H. M-B.

Kofoid (Charles A.) & Swezy (Olive). **Amebiasis of the Bones.**—*Jl. Amer. Med. Assoc.* 1922. May 27. Vol. 78. No. 21. pp. 1602–1604. With 7 text figs.

" Amebas in the lesions of Ely's non-bacterial or second type of arthritis " were identified by the authors of this paper. Many instances of the coincidence of amebiasis with arthritis have come to their notice during the last four years.

In one case, in which the tissues were preserved in formaldehyde, they found " ameboid cells " which they interpret as " *Endameba dysenteriae.*" These are said to occur in the head of the excised femur in the immediate neighbourhood of the necrotic areas near the eburnated joint surface. They have vacuolated protoplasm and a few are filled with red blood corpuscles or what appear to be their remnants ; many have pseudopodia. All have a vesicular, spherical nucleus said to be characteristic of *E. dysenteriae.*

The disappearance of the nuclear membrane during mitosis and the formation between the daughter centrosomes, at the poles of the spindle, of a type of connexion known as the central spindle, or centrodesmose, are quoted as features which distinguish these "amebas" from surrounding cells. By " assiduously searching " sections of the excised femur several binucleate " amebas " were discovered in the territory in which cells interpreted as " amebas " were originally found and the nuclear spindle is contrasted with a dividing epitheloid cell from a gland of Hodgkin's disease.

In the " amebas " of the intestinal tract the number of chromosomes is eight, in *Entamoeba coli* it is six, while the number of somatic chromosomes in man is either 24 or 48. On the basis of the type of mitosis and number of chromosomes in the cell, the amoeboid organisms in the bone marrow are " amebas " rather than amoeboid human cells. The question is considered whether the " ameba " of the bone is that of the bowel or of the teeth and tonsils (*E. gingivalis*), but they incline to the view that it more closely resembles *E. dysenteriae.*

[Considerable hesitation will be felt in accepting the interpretation or conclusions of these workers without more direct evidence than that based upon mitotic figures.]

P. H. M-B.

KOFOID (Charles A.), BOYERS (Luther M.) & SWEZY (Olive). **Occurrence of *Endameba dysenteriae* in the Lesions of Hodgkin's Disease.** —*Jl. Amer. Med. Assoc.* 1922. May 27. Vol. 78. No. 21. pp. 1604–1607. With 7 text figs.

Sections of glands of Hodgkin's disease, in some cases associated with active intestinal amoebiasis and the passage of cysts of *E. dysenteriae* in the faeces, demonstrated to the satisfaction of these workers certain amoeboid cells closely resembling this pathogenic protozoon. The discovery of the characteristic "ameba" mitosis described above encouraged the authors to search for "amebas" in the lymphatic glands of Hodgkin's disease. Prolonged and assiduous search revealed cells suspiciously like amoebae, sometimes typical, sometimes degenerating. The remaining arguments in favour of their claim have already been cited in the previous article. [Neither the argument nor the figures of individual "amebas" in the affected glands are at all convincing.]

P. H. M-B.

IZAR (Guido). **Forme rare di amebiasi latente e cronica. La sindrome pseudo-malarica. La sindrome pseudo-tifica.** [Rare Forms of Latent and Chronic Amoebiasis. Pseudo-malaric and Pseudo-typhoid Syndromes.]—*Policlinico.* Sez. Prat. 1921. July 11. Vol. 28. No. 28. pp. 939–942.

The pseudo-malarial syndrome described by the writer is characterized by anaemia and intermittent fever. In a region where malaria is very common the diagnosis is not easy. In a case described it was arrived at by the absence of splenic enlargement, the failure of quinine treatment and the negative blood examination. In a second case a suspicious diarrhoea led to an examination of faeces and the discovery of *Entamoeba histolytica.*

The pseudo-typhoid syndrome is characterized by severe intestinal symptoms and persistent high temperature with cerebral symptoms. The first case reported showed the following clinical picture: diarrhoea, furred tongue, foetid breath, temperature remaining between 102° and 103° for a fortnight with severe headache, typhoid state and delirium. During convalescence the serum was tested and failed to agglutinate either *B. typhosus* or either of the paratyphoid groups, or the "*Micrococcus Brucei.*" Entamoebae were subsequently found in the stools and the patient was successfully treated with emetine.

J. Rosslyn Earp.

SANFILIPPO (Emanuele). **Appendiciti e pseudo-appendiciti di origine amebica.**—*Policlinico.* Sez. Prat. 1921. Dec. 19. Vol. 28. No. 51. pp. 1715–1719.

Attention has often been drawn to the occurrence of appendicitis as a complication of amoebic dysentery. The writer, who also cites cases in support of the thesis that amoebic appendicitis is more common than is generally supposed, goes on to describe two more in which the symptoms of appendicitis were present without any lesion of the appendix. There are thus to be distinguished (*a*) acute appendicitis with perforation occurring in acute amoebic dysentery, the condition being usually first discovered at autopsy; (*b*) localized inflammation of the appendix in the course of chronic dysentery with a symptom

complex characteristic of relapsing chronic appendicitis; and (*c*) a pseudo-appendicitis in which the appendix is found to be healthy in operation or at necropsy. The symptoms in this case would appear to be due to reflexes from an ulcerated caecum.

J. Rosslyn Earp.

NOGUE. **Un cas de cystite amibienne.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1919. May. Vol. 1. No. 1. pp. 22–24.

A native of Senegal, 22 years of age, had suffered for nine years from intermittent haematuria, due probably to vesical bilharziasis. A year before consultation he had suffered from dysentery. Shortly afterwards a painful cystitis supervened, for which he was examined, and the urine was submitted to LÉGER, who reported the absence of ova of *S. haematobium*, but, on the other hand, numerous active entamoebae with granular endoplasm and ingested erythrocytes of a diameter of 20$\mu$. Improvement commenced directly emetine treatment was instituted:—2–6 cgm. were given at two-day intervals by the intravenous route. The urine became normal and the amoebae disappeared. A second course of emetine treatment was instituted a month later and no relapse has occurred. The author thinks the pathogenic rôle of the amoeba in this case incontestable.

P. H. M-B.

JACKSON (Leila). **An Ameba-like Organism in the Kidneys of a Child.** —*Jl. Infect. Dis.* 1922. June. Vol. 30. No. 6. pp. 636–642. With 2 plates.

A child of 15 months died suddenly in convulsions. At autopsy broncho-pneumonia, enlarged mesenteric glands, congestion and fatty changes in the liver, and parenchymatous nephritis were found. In sections of the kidneys, especially in the secreting tubules, round eosin-staining bodies arrested attention. The surrounding tissue reaction was mild; stained with polychrome methylene blue the bodies colour a peculiar blue, which readily distinguishes them from the deep purple kidney cells.

The forms assumed by this "parasite" varied from 10–18$\mu$ in diameter. Certain forms appeared to be undergoing schizogonic changes and nuclei in the various stages of mitosis were numerous. Encysted forms were also encountered. These bodies are compared to similar appearances described by other observers in the organs of a syphilitic foetus.

[Two plates illustrate this article; the first is composed of semi-diagrammatic figures of the supposed organism, while in the second microphotographs of sections of kidney tubules are represented; in neither case do these bodies at all suggest parasites.]

P. H. M-B.

WARTHIN (Aldred Scott). **The Occurrence of *Entamoeba histolytica* with Tissue Lesions in the Testis and Epididymis in Chronic Dysentery.**—*Jl. Infect. Dis.* 1922. June. Vol. 30. No. 6. pp. 559–568. With 7 text figs.

This case is a curious one. The patient had suffered a great deal from dysentery in China; he died subsequent to an operation for supposed hepatic abscess. At autopsy the following condition was reported: unresolved croupous pneumonia with early abscess formation and organization; purulent bronchitis; early atrophic cirrhosis;

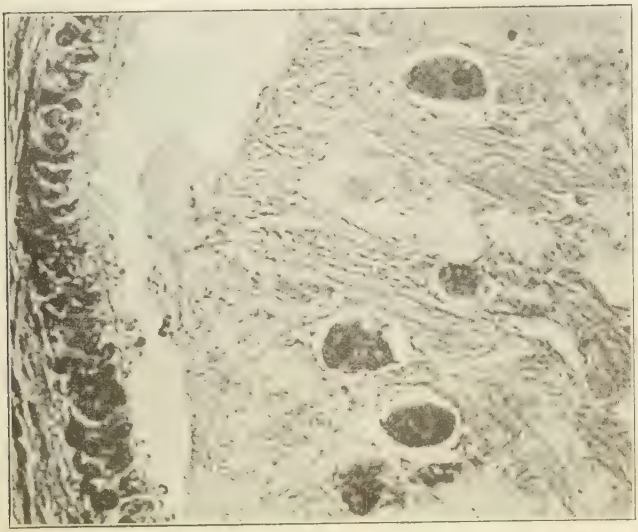


FIG. 1. Portion of clot containing *Entamoeba histolytica*, from tail of epididymis

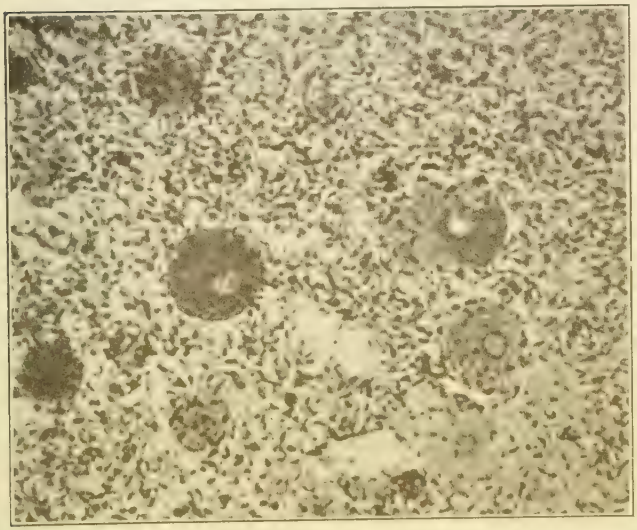


FIG. 2. *Entamoeba histolytica* in mass of sperm from epididymis. The characteristics of the nucleus are well shown, as is also the phagocytosis of spermatozoa by them.

[Reproduced by permission from the *Journal of Infectious Diseases*.]

chronic passive congestion of spleen with fibrosis; healed chronic amoebic dysentery; metastasis of *Entamoeba histolytica* to epididymes and testes with local lesions; latent syphilis. The epididymis was dilated; spermatocele on left; left testis large, on section a fibroid patch; right testis smaller and firmer, stroma increased; prostate slightly enlarged. On microscopical examination of the epididymes both, particularly the left, showed marked dilatation of the ducts; these were filled in part with masses of spermatozoa through which great numbers of amoebae were scattered. In the sperm-filled ducts there was little fibrin and the amoebae were rounder than in the fibrin clots in the vasa. No blood-cells were found in the amoebae in the semen, but there was marked phagocytosis of spermatozoa by the amoebae. On the left side a number of large dilated ducts at the head of the epididymis contained a heavy albuminous, almost hyaline, precipitate without spermatozoa or amoebae. About the ducts the connective tissue was thickened and the blood-vessels sclerotic. The ductuli efferentes contained fibrin clots in which amoebae were present; the adult types of amoebae showed marked phagocytosis of red cells.

The amoebae found in the testes corresponded in every way to those previously found in the stools of the patient when first seen; in the dilated duct of the epididymis many degenerating forms, as well as precystic and cystic forms, were present. In some cases spermatozoa had been ingested.

The case presents, therefore, the unique occurrence of the metastasis of *Entamoeba histolytica* to the epididymis with definite, though slight, local lesions in these organs in a patient affected for many years with amoebic dysentery.

[The microphotos which illustrate the article certainly suggest that the organism depicted is in fact *Entamoeba histolytica* (see figs., p. 687).]

P. H. M-B.

Le Noir & de Fossey (Mathieu). **Épreuve biliaire pour le diagnostic et le traitement de la dysenterie amibienne.** *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. July 6. 38th Year. 3rd Ser. No. 23. pp. 1024–1028.

The diagnosis of intestinal amoebiasis is often in doubt on account of the well-recognized difficulty of finding entamoebae or their cysts, so that it is necessary to examine stools microscopically on many occasions in order to obtain the necessary evidence. The authors have conceived the idea that by rendering intestinal conditions favourable to entamoebae the search for them in the stools will be rendered less difficult, and treatment more efficacious; in other words, he aims at provoking an artificial relapse. Bile extract is given in the form of desiccated powder in keratinized capsules, commencing with nine capsules daily, each containing 0·2 gm., three after each meal. During this period the patient maintains the customary regime. When the stools become fluid the organisms appear and cysts are passed in numbers, and the newly produced parasites are, as suggested by Ravaut, more susceptible to the action of emetine bismuth iodide.

The first series of 11 cases were treated by this method, together with emetine injections, totalling 0·4 cgm. in all. Six apparently were cured, but the remaining five were doubtfully improved, the standard of "cure" being assessed upon failure to find cysts following diarrhoea provoked by bile cachets.

In the second series 9 cases were first subjected to an intravenous injection of 0·3 gm. neosalvarsan. The following day they received three soup-spoonfuls of Ravaut's paste, *i.e.* :—

| | |
|---|---|
| Powdered charcoal .. .. .. | 100 gm. |
| Powdered subnitrate of bismuth .. | |
| Syrup .. .. .. .. .. | |
| Glycerin .. .. .. .. .. | |
| Powdered ipecacuanha.. .. .. | 4 gm. |

The treatment is continued for 12 days; alternately Ravaut's as above, and 0·1 gm. neosalvarsan in two doses of 0·05 gm. each. The results were apparently very favourable.

The third series of 2 cases were given emetine bismuth iodide, but on account of the severity of the reaction treatment had in each instance to be abandoned.

The fourth series consisted of 2 cases with severe rectal ulceration; they were given Ravaut's paste by the mouth and rectal injections of mucilage, bismuth and neosalvarsan, with rapid improvement of the symptoms.

P. H. M-B.

GAUDUCHEAU (A.). **Remarques sur les amibes cultivables parasites de l'intestin de l'homme.** *Bull. Soc. Path. Exot.* 1922. Apr. 12. Vol. 15. No. 4. pp. 229–237. With 2 text figs.

Gauducheau combats the statement of DOBELL that the amoebae cultured from human faeces are free-living species and incapable of living in the human intestine [this *Bulletin*, Vol. 1, pp. 181–182] as not consistent with fact. In 1907 he described as *Entamoeba phagocytoïdes* a species he had observed in Cochin-China, and he here returns to the subject.

In 1916 a cholera epidemic broke out in Cochin-China amongst the Annamite Labour Corps, necessitating systematic stool examinations on a large scale. The ectoplasm of this amoeba—better called *Endolimax phagocytoïdes*—which frequently occurred in the stools, is quite characteristic; it is hyaline and forms a border to the organism, quite distinct from that of other recognized species. The nucleus is also quite distinctive, having a large spherical karyosome, generally centrally placed, and a well-developed nuclear membrane. By the methods of MOUTON, LESAGE, MUSGRAVE and CLEGG the organism can be cultured in close association with bacteria; for instance, organisms of the *coli* or *pasteurella* groups symbiose well, to a lesser extent do *staphylococci*, while gram-positive spore-bearing bacilli of the *subtilis* and *mesentericus* groups kill the amoebae out entirely. When red blood corpuscles such as those of a monkey are added to the medium, they are ingested with avidity; thus five or six erythrocytes have been seen within a single amoeba. Morphologically, at any rate, this amoeba greatly resembles certain small amoebae occurring in water in Indo-China; on the whole these latter are more easily cultivated. In spite of the similarity in structure, Gauducheau thinks it premature to assume that they are identical with the free-living forms. No cysts have as yet been observed in cultures.

P. H. M-B.

LEONE (Raffaele). **Contributo alla diagnosi micro-biologica della dissenteria amebica.**—*Riforma Med.* 1921. Feb. 5. Vol. 37. No. 6. pp. 129–130.

In testing a large number of stools daily there is not time to use the finer methods of distinguishing *Entamoeba histolytica*. The use of methylene blue as a differential dye has not always been satisfactory. Lately the writer has made successful use of the method of CUTLER & WILLIAMSON [this *Bulletin*, Vol. 11, p. 250], but finds that their solution of neutral red (1 in 1,000) is too strong and prefers a solution of half the strength [CUTLER & WILLIAMSON's solution was 1 in 10,000]. This he makes daily in small quantities, as after 24 hours the colour is liable to precipitate. The writer has tried various other red dyes (Magdala red, Magenta red, Congo red, Sudan III, etc.), but concludes that neutral red solution 1 in 2,000 of 0·75 salt solution is the most satisfactory.

J. Rosslyn Earp.

ALLAN (William). **The Effect of Emetinized Blood and Serum from Man and Cat on Pathogenic Entamoebae in Stools.**—*Amer. Jl. Trop. Med.* 1922. May. Vol. 2. No. 3. pp. 195–198.

Emetine is not particularly toxic when applied to pathogenic amoebae within the time limit of one to two hours; according to DALE & DOBELL it acts upon the host rather than upon the parasite. Blood and emetine mixtures were made by adding to whole blood an equal amount of a 4 per cent. sodium citrate solution containing emetine hydrochloride 1 : 500. To the serums of cat and human blood was added an equal amount of a 1 : 200 emetine solution. Equal parts of each of these mixtures and the dysenteric stool were stirred vigorously on slides and observed under cover glasses for approximately an hour; dilutions were made with distilled water and after two hours the control amoebae were still active. From information summarized in tabular form we gather that human blood and serum mixed with emetine had no more effect than cat blood and serum similarly mixed. The effect of blood withdrawn from man and cat two or three hours after therapeutic doses of emetine was next tested. The observations showed that citrated blood of man and cat so withdrawn had no effect on entamoebae in stools in dilutions weaker than 1 : 8 when observations were conducted over the space of one hour.

P. H. M-B.

BROWN (H. C.). **Observations on the Amoebicidal Action of Conessine.**—*Brit. Med. Jl.* 1922. June 24. pp. 993–994.

Conessine, an alkaloid having the formula $C_{12}H_{20}N$, has been isolated from several members of the natural order, Apocynaceae. It has been obtained from *Holarrhenica antidysenterica* in India and from *Holarrhenica congolensis* from the Belgian Congo. Failing to obtain suitable material containing *Entamoeba histolytica* in sufficient numbers, experiments were undertaken with cultures of pond amoebae. It is known that infusions of the seeds of these plants have long been used with success in the treatment of chronic dysentery. When injected subcutaneously in medicinal doses conessine produces locally an area of necrosis; on the other hand, it can be administered by the mouth in

suitable doses without producing untoward symptoms. Experiments upon mice prove it to be 50 per cent. less toxic than emetine. A distinct diminution of the amoebicidal action of emetine and conessine takes place when brought into contact with intestinal mucus. When planted on media containing a concentration of 1 in 1,000,000 conessine sulphate the growth of freshwater amoebae is inhibited.

P. H. M-B.

KILPATRICK (G. C.). **Prevalence of Entamebic Disease: Diagnosis and Treatment.**—*Southern Med. Jl.* 1922. Apr. Vol. 15. No. 4. pp. 275–278. [Discussion, pp. 278–280.]

This paper contains an exposition of somewhat highly-coloured views upon the possibility of spread of amoebiasis in the United States. It is justifiable, he thinks, to assess the incidence among 2,000,000 overseas men at 20 per cent. The figure amongst the home-staying population is assessed at 4 per cent. "It is easy to see what a colossal epidemic of amebiasis occurred within the short period of about one year." Emetine hydrochloride is considered a very dangerous drug. Its chief value in treatment is in direct proportion to the acuteness of the disease.

P. H. M-B.

BRUGEAS. **Sur un début de dysenterie à forme appendiculaire.**—*Arch. Méd. et Pharm. Nav.* 1921. May–June. Vol. 111. No. 3. pp. 256–259.

This paper embodies an account of a case of amoebiasis particularly affecting the caecum and causing a clinical condition resembling appendicitis.

P. H. M-B.

## BACILLARY DYSENTERY.

RIGANTI (Humberto). **Estudios epidemiológicos sobre la disenteria bacilar en la República Argentina (Segunda communicación).** [Epidemiological Studies of Bacillary Dysentery in the Argentine.] —*Rev. Inst. Bacteriolog.* 1921. Mar. Vol. 2. No. 6. pp.281–288.

In 1918 an epidemic of dysentery occurred in Catamarca and La Rioja attacking both infants and adults. From 42 patients bacteria were isolated, but in none of these cases were the usual organisms found, namely Shiga-Kruse, Flexner, or Hiss bacilli. The author quotes instances in which atypical dysenteries occurred elsewhere, that is, cases in which none of the above-mentioned organisms were isolated, notably MORGAN's investigations in 1905 to 1908, LEWIS, ROSS and others in 1910 and 1911, and TRIBONDEAU and FICHET in patients from the Dardenelles in 1916. He also mentions the statement of BURNET and LEGRAUX in their paper entitled "Le Diagnostic bacteriologique de la Dysenterie bacilaire" [this *Bulletin*, Vol. 14, p. 324], in which the conclusion is given that the only organisms which should be regarded as causative of bacillary dysentery are the bacilli of Shiga-Kruse, Hiss, Strong, and Flexner.

Among the 42 cases studied by the author, however, in 24 instances he isolated Morgan's bacillus, in 15 that of Strong, and in the remaining 3 the "Para-Flexner" bacillus. The last-named differs from the Flexner organism in producing acid in sorbite, dulcite and Petruschky's milk media. Toxins were obtained from these bacilli [the method of preparation is not stated], which caused the death of rabbits of

600-700 gm. weight in doses of 1 cc. injected intravenously, and the author concludes that the organisms isolated were causative of the epidemic studied, though he gives no reasons other than the fact that they were isolated from the faeces while the usual organisms and also the *Entamoeba histolytica* were not discovered.

H. Harold Scott.

MSCIWOJ (Lemeran). [**La bactériologie, la pathogénèse et la clinique de la dysenterie.**]—*Nouvelles Méd.* Poznan. 1921. Vol. 33. Nos. 1–5. 1st Pt. pp. 14–21. [Summarized in *Bull. Inst. Pasteur.* 1922. Mar. 15. Vol. 20. No. 5. pp. 195–197.]

These researches were undertaken on 40 recruits of the Polish army suffering from bacillary dysentery. The diagnosis was established by two methods. By culture of the faeces four positive isolations of Shiga's bacillus were obtained. The serum reactions were tested in 33 cases and a positive result obtained with known types of dysentery bacilli, in 19 of which it was the Shiga-Kruse bacillus; in the latter series agglutination occurred with Flexner-Y and Strong. The negative results are explained by the author on the assumption that no antibody formation takes place in the serums of certain cases, of which two were fatal. The suggestion is made that the epidemic in Poland was introduced from the East. Attempts to isolate the organism from the blood were not attended with success. The epidemic in Poland in 1920 was, on the whole, mild in character, the mortality rate being assessed at 7 per cent. The following hypothesis on the pathology of dysentery is set forth :—

It is suggested that the micro-organisms of dysentery introduced into the human body, by direct contact or ingestion with food, penetrate the upper part of the intestine, where they remain for a certain time, causing an alteration of the mucosa and thereby gaining entrance to the blood; in the blood-stream they are conducted to the large intestine, where they produce the well-known lesions.

The initial prevalence of the organisms in the upper portion of the digestive tract will explain the clinical phenomena of dyspepsia and other vague digestive troubles in the prodromal stage of the illness with the development of rigors and bloodstained stools. Pyrexia would indicate the entrance of the bacilli into the blood.

P. H. M-B.

SPENCE (Ralph C.). **Infectious Diarrhea in Young Children.**—*Southern Med. Jl.* 1922. Mar. Vol. 15. No. 3. pp. 189–193.

Acute diarrhoea in infants and young children in which the onset is sudden with fever and prostration, and the stools contain blood and mucus for several days, is certainly due to one of the dysentery bacilli; while, on the other hand, those cases without bloodstained stools are probably not due to these organisms. The title of the present paper should then read "Bacillary Dysentery in Young Children." In view of the difficulties attending the isolation of dysentery bacilli from the faeces, the much more efficacious method has been evolved of making cultures from the rectum by means of the proctoscope. In 1920, 60 infants and young children with diarrhoea were thus examined, with the result that every case having the clinical picture of bacillary dysentery gave a positive culture; these were 9 in number, 7 Flexner and 2 Shiga.

P. H. M-B.

MITA (Koh). **Ueber die ruhrartigen Krankheiten der Kinder, insbesondere ueber ihre Erreger.** [Dysentery-like Diseases of Children and their Causes.]—*Mitt. a. d. Med. Fak. d. Kais. Kyushu-Univ.* Fukuoka, Japan. 1921. Vol. 6. No. 1. pp. 111–127.

This paper, based upon an investigation of dysentery in children in Japan, runs on familiar lines. The author is of the opinion that true dysentery or dysentery-like symptoms are produced by various types of bacilli; no fewer than one-third of the cases of dysentery are caused by organisms which do not conform to the true type, and these are the paradysentery organisms isolated and recognized by Mita for the first time. The paradysentery are small rod-like non-motile bacilli, which ferment glucose without gas formation; milk is clotted after 2–3 weeks culture, and in old subcultures still earlier; they form regular rounded colonies, which are characteristic; they can be classified from their reactions in carbohydrates into two types; and they are infectious and pathogenic and produce diphtheritic inflammation of the bowel wall in man Dysentery-like symptoms can be produced by paratyphoid and allied organisms. One type, closely related to the paratyphoid group and discovered by the author, is slightly motile and ferments mannite and glucose with gas formation. It is pathogenic to man and is known as paratyphoid X.

P. H. M-B.

KLING (D.). **Chronische Bazillenruhr und Colitis gravis.**—*Wien. Klin. Woch.* 1922. Mar. 16 & 23. Vol. 35. Nos. 11 & 12. pp. 239–243; 271–274.

Chronic haemorrhagic, and suppurative colitis were formerly regarded as distinct entities, but since the war these conditions are recognized as forms of chronic bacillary dysentery. ALBU, in 1915, concluded that ulcerative colitis and chronic bacillary dysentery were one and the same disease, the absence of a specific agglutination reaction against dysentery bacilli being considered of little import.

Eleven cases are cited by the author in which chronic bacillary dysentery has been observed to merge into chronic ulcerative colitis. Clinically these cases resemble grave forms of ulcerative colitis, and rectoscopic examinations bear this out. The stools were mucoid, with blood and pus; anaemia and cachexia were associated with wart-like outgrowths and a polypoid condition of the mucosa. One patient died after eight months sickness. This condition, in which acute inflammation of the mucosa with formation of polypi and granulation tissue takes place, is well termed "colitis gravis." From hitherto published statistics middle-aged persons appear to be the most liable, children and those over 50 being seldom affected.

The etiology of submucous abscesses is not clear; they apparently begin as epithelial downgrowths, with formation of cysts, which subsequently become infected and purulent. Six cases of "colitis gravis" are described in which the evidence of previous bacillary dysentery, either from stool isolation or from serological reactions, could be taken as fairly conclusive. The author considers that some factor is at work preventing the complete healing of the mucosa in the acute stage; that such causes as unsatisfactory treatment, chronic bad health, anaemia and intercurrent complications are at work. The

various methods of treatment hitherto commonly employed are summarized; none is regarded as satisfactory. Attempts at improving the general condition by dietetic measures have given the best results.

P. H. M-B.

TSCHERNING. **Cholecystitis dysenterica chronica.**—*Muench. Med. Woch.* 1922. July 21. Vol. 69. No. 29. p. 1085.

In this particular case the patient contracted bacillary dysentery in Macedonia in 1918. This was followed by dyspeptic symptoms and pain referred to the gall-bladder. At operation a chronically inflamed gall-bladder was discovered, from which dysentery bacilli of the Y type were obtained. The author therefore considers that cholecystitis may be quite a common complication of bacillary dysentery, and that the infection of the biliary tract possibly gives rise, as in enteric, to the carrier state. It is possible that in the future the duodenal sound will be introduced as a means of procuring material for culture in doubtful cases.

P. H. M-B.

MATHIAS (E.) & HAUKE (Hugo). **Zur Infektiosität chronischer Ruhrfälle.** [Infectiousness of Chronic Dysentery Cases.]—*Zentralbl. f. Chirurg.* Leipzig. 1921. Sept. 3. Vol. 48. No. 35. pp. 1270–1271.

There is little original in this paper, which consists of an account of a fatal termination of a case of appendicectomy. At the post-mortem, signs of early dysenteric lesions were found in the mucosa of the rectum. It is conjectured that the infection was contracted from a case of chronic bacillary dysentery in the same ward. The authors dilate upon the lessons to be derived from this experience and suggest that chronic dysenterics should be regarded as infectious cases and nursed in separate wards.

P. H. M-B.

GOYON (Am.) & DEBRAY (Jacques). **Polynévrite consécutive à une dysenterie bacillaire à Shiga.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Jan. 19. Year 38. 3rd Ser. No. 2. pp. 129–131.

This is an account of a polyneuritis supervening in the course of a dysentery of bacillary origin—in the author's opinion, a Shiga infection. The patient, residing in a village in which bacillary dysentery was at the moment epidemic, had suffered from several dysenteric relapses and was treated with antiserum. The polyneuritis supervened suddenly, when he was apparently convalescent; his serum agglutinated Shiga's bacillus in a dilution of 1 : 20. The neuritis affected him in the following manner: a flaccid paraplegia of the inferior extremities with abolition of reflexes, muscular hyperaesthesia and a negative Babinski response. The upper extremities were completely paralysed and the interossei wasted, as in the Aran-Duchenne type of muscular atrophy. The cerebrospinal fluid was normal and recovery was complete.

P. H. M-B.

YOUNG (H. M.). **Ulcerative Colitis due to *Bacillus dysenteriae*, simulating Pernicious Anaemia.** *Canadian Med. Assoc. Jl.* 1922. May. Vol. 12. No. 5. pp. 332–333.

A record of a case of profound secondary anaemia in which the loss of blood preceded intestinal symptoms. Liver and spleen were both enlarged, there was oedema of both legs and a small sausage-shaped mass was palpable to the left of the umbilicus. Red blood corpuscles numbered a million, with haemoglobin 10 per cent. (Daré)! Repeated blood transfusions resulted in a noticeable improvement in the patient. Proctoscopic examination of the rectum and sigmoid revealed haemorrhagic ulceration and subsequent stool culture yielded *B. dysenteriae* Flexner. Great improvement followed ileostomy with removal of the appendix and subsequent daily colonic irrigations of normal saline and silver nitrate 1 : 10,000.

P. H. M-B.

DAVISON (Wilburt C.). **The Bacteriolysant Therapy of Bacillary Dysentery in Children. Therapeutic Application of Bacteriolysants ; d'Herelle's Phenomenon.**—*Amer. Jl. of Dis. of Children.* 1922. June. Vol. 23. No. 6. pp. 531–534.

It has been demonstrated by D'HERELLE and others that faeces taken from a dysenteric convalescent contain an extract which, when added to young cultures of dysentery bacilli, will kill and dissolve the organisms. The names bacteriophage, bacteriolysant and lytic agent have been given to these filtrates. When injected intravenously or subcutaneously into rabbits and other animals they produce no harmful effects, but the animals develop antibodies for the organisms. KABESHIMA and others have demonstrated that injections of an anti-dysentery bacteriophage into rabbits infected with dysentery bacilli are harmless, and this has been the author's experience.

Bacteriolytic filtrates against one or more strains of Flexner bacilli were obtained and administered to 12 infants, aged from 2 months to 4 years, suffering from bacillary dysentery, from 10 of which cases Flexner bacilli were isolated. The dose varied from 5 to 198 cc. and was given from one to ten times, either by mouth or per rectum, the total amounts varying from 5 to 1,381 cc. Nine were severe cases and 7 died (mortality 78 per cent.). The conclusion is reached that bacteriolysant therapy does not influence the course of the disease, and that this failure may possibly be explained on the ground that treatment was commenced too late.

P. H. M-B.

LORNIE (P.) & JONES (D. Ellis). **The Treatment of Asylum Dysentery by Means of Antidysentery Serum.**—*Brit. Med. Jl.* 1922. June 17. pp. 949–950.

The treatment of asylum dysentery by means of antidysenteric serum is an important subject, for during the second half-year 1921 the number of persons in mental hospitals attacked by dysentery was 728, of whom 126 died. Serum used was supplied by Messrs. Burroughs Wellcome and Co., and by Messrs. Evans, Lescher and Webb.

The injection was made subcutaneously in doses of 20–45 cc. The smaller amount was repeated daily, even up to four consecutive

days. In 10 cases recorded, the improvement of the patient was instant and remarkable. The results obtained are more satisfactory than any previous records. Apart from the rapid improvement of the stools, the rapid fall in the temperature and immediate and marked physical improvement of the patient have been the main features.

P. H. M-B.

LANTIN (Pedro T.). **Various Methods of Serum Application in Bacillary Dysentery.**—*Philippine Jl. Sci.* 1921. Dec. Vol. 19. No. 6. pp. 629–641. With 6 text figs.

During 1918 there were admitted to the medical wards of the Philippine General Hospital 164 cases of bacillary dysentery, chiefly in adults from 20 to 30 years of age. The disease occurs throughout the year, especially in the rainy season (July, August and September), when flies are abundant. Out of 66 cases in which cultures were made from stools, 30 were Shiga, 7 Flexner, and undetermined types 14.

Serum, being difficult to obtain, was used only in the most serious cases. The mortality rate in the series was 8·53 per cent. Of 105 receiving antidysenteric serum 12 died, a mortality rate of 11·42 per cent.

The methods of serum administration were (1) per rectum alone; (2) intramuscular injection and per rectum (enema); (3) intramuscular injection alone; (4) intramuscular and intravenous injection; (5) intravenous injection alone.

The classification into clinical types is difficult and should be based, it is suggested, upon the general condition of the patient, rather than upon the number and nature of the evacuations.

Serum per rectum is introduced through a funnel and long rubber tube, the patient being in the knee-elbow position. A preliminary cleansing enema of sodium bicarbonate (1·5 per cent.) is followed by a sedative enema of 60-100 cc. of starch solution with 15 drops of laudanum. The high serum enema of 30–80 cc. is given half an hour later. In this manner 9 cases were treated with success.

The combined method—serum per rectum plus intramuscular injection—was applied in 10 severe cases; there were 2 deaths.

The third series, all classified as of severe type, comprised 64 patients. There were 5 deaths. The injection of 20-60 cc. was made daily into the buttocks, as long as considered necessary. Later 20 cc. was injected every four hours for the first three days after admission and 20 cc. twice daily thereafter.

In the fourth series intramuscular and intravenous injections were combined in 13 cases, all very severe. Five cases died.

In the fifth series intravenous injection was tried on nine cases, all of which recovered. The dosage employed was 10–20 cc. daily, 1 cc. being injected four to six hours previously, so as to avoid anaphylaxis. The reaction following intravenous injection was mild; usually a chilly sensation lasting from 30 to 60 minutes ensued, accompanied by a rise in temperature, with slight acceleration of pulse and respiration.

In an acute disease like bacillary dysentery early application of specific therapy is imperative on account of the very definite pathological processes going on in the large intestine and because of the severe toxaemia. Suspicious cases should not await the results of the bacteriological examination, especially children. The serum is both antitoxic and bactericidal; its administration per rectum should mean

the local neutralization of the toxin. Clinical observation supports this view—24 hours after the injection of serum per rectum the patient feels much relieved. There are, of course, drawbacks to this method; the serum may not reach the whole area of tissue involved, or may fail to neutralize the toxins already absorbed. It succeeds best when the patient is able to retain the serum for some time; in specific cases this may be from two to four hours.

In the administration of serum by intramuscular injection the main purpose is to neutralize the toxin as much as possible by the specific antibodies. The results are gratifying. In the author's opinion the combined method of intramuscular and rectal injections in acute cases offers the best chance of success. The action of serum injected intravenously is similar to that of intramuscular serum, but the effects are more rapid. Its special indication is in severe cases. In the series of 105 cases treated with serum, no symptoms referable to serum sickness were observed, though later it is said that there developed alarming symptoms, resulting in one case in death and, in a second, in urticarial and joint pains appearing on the eighth day.

P. H. M-B.

DE JONG (D. A.). *Bacterium dysenteriae* **typus Flexner en** *Bacterium dysenteriae* **typus Leiden.**—*Tijdschr. v. Vergelijkende Geneesk., enz.* 1922. Apr. 1. Vol. 8. Nos. 2 & 3. pp. 101–106. [English summary, p. 107.]

Dysentery in Leyden in 1918 was caused by two types of Flexner bacilli, differing very slightly from each other. Indol formation was absent and milk slowly coagulated in one, in which characters it resembled a similar strain described by BAERTHLEIN and D'HÉRELLE. Two new cases occurred in 1921; from one the pure Flexner type was isolated, from the other the organism described above.

P. H. M-B.

PATTERSON (S. W.) & WILLIAMS (F. E.). **The Sonne Dysentery Bacillus in Australia.**—*Jl. Path. & Bact.* 1922. July. Vol. 25. No. 3. pp. 393–394.

From a fatal case of gastro-enteritis a Flexner-like organism was isolated in Melbourne; it was noted that the colonies were larger, and after 24 hours culture they were more opaque with thicker centres and spreading margin. From two cases of acute colitis in adults and from three of acute diarrhoea in children an almost pure culture of the same organism was obtained. The bacilli were agglutinated by only one monovalent serum (X Hughes). The organism corresponds with the dysentery bacillus of SONNE, a bacillus also investigated by THJÖTTA. Intraperitoneal injections of young cultures produced intestinal ulceration in those rabbits which survived long enough [see this *Bulletin*, Vol. 7, p. 223].

P. H. M-B.

KORTHOF (G.). **Some Notes on the Bacteriology of Dysentery.**—Reprinted from the *Transactions of the 4th Congress of the Far Eastern Assoc. of Trop. Med.* Weltevreden: Javasche Boekhandel en Drukkerij Rijswijk. 14 pp.

This paper, for the most part, consists of a résumé of recent literature on bacillary dysentery, all of which has, from time to time, been reviewed in the pages of this *Bulletin*. The author suggests a method

of plating out dysenteric exudate with a view of isolating dysentery bacilli to the best advantage. One cc. of blood and mucus is mingled in a tube with 9 cc. of aqua destillata, and of this 1 cc. is put in a second tube of 9 cc. also of aqua destillata until dilutions of 1 : 1,000 and 1 : 10,000 result. From the fluid of both these dilutions two or three drops are taken and spread upon the entire surface of a plate, when very regularly distributed colonies result.

P. H. M-B.

Coppinger (F. R.) & Robertson (R. C.). **Preliminary Experiments with a View to the Preparation of a Non-Toxic Dysentery Vaccine.** —*Jl. Roy. Army Med. Corps.* 1922. Apr. Vol. 38. No. 4. pp. 243–250.

The experiments recorded refer only to Shiga's bacillus. Attempts to dissolve suspensions of this organism with decinormal and normal sodium hydrate were unsuccessful, but when neutralized with normal hydrochloric acid the suspension became opaque and could be subsequently precipitated with excess of absolute alcohol. The precipitate when washed and dried formed a white powder. Portions of the powder, equivalent in weight to 20 million, 200 million and 400 million unaltered Shiga bacilli, were injected intravenously into rabbits without the supervention of toxic symptoms. After a dosage equivalent to 200 million untreated Shiga bacilli given at weekly intervals this animal was found to be immune to approximately ten times the fatal dose of these organisms for an animal of the same weight.

The minimum lethal dose of the strain of Shiga's bacillus utilized in these experiments was found to be 0·01 mgm. (equivalent to 20 million bacilli), which was just sufficient to kill a rabbit of 1,000 gm. in three days when injected intravenously; when given by the subcutaneous route the dosage was found to be considerably larger and to be 1 mgm. of dried bacilli. The amount of alcohol required for reducing the toxicity of Shiga's bacillus was considerable, so that precipitation with ammonium sulphate, as being more rapid and economic, was resorted to.

To a thick emulsion of Shiga bacilli an equal bulk of liquor ammoniae fortis (B.P.) was added; the mixture after being incubated at 37° C. overnight being neutralized by 20 per cent. sulphuric acid. No precipitation occurs till the neutral point is reached. The precipitate is practically non-toxic. Little reliance being placed upon agglutination production in rabbits as an index of the degree of immunity conferred, a series of 10 rabbits was inoculated, five subcutaneously and five intravenously with ammonia-treated bacilli, with the result that all the animals inoculated subcutaneously survived without any obvious reactions, save a slight temporary loss in weight. Three of the series injected intravenously died after the first inoculation, which was apparently too large, but the two which had received 0·1 mgm. survived and afterwards received larger doses, without any ill effects. The anti-toxic power of the serum of the immunized animals was not so great as had been anticipated, but one animal injected with 0·1 mgm. (10 M.L.D.) survived.

Human experiments on a large scale have not yet been carried out. Subcutaneous injections of 0·03, 0·075, 0·15 and 0·3 mgm. of treated Shiga bacilli (equal to 60, 150, 300 and 600 millions) caused slight local tenderness and induration which persisted for some days.

P. H. M-B.

WATANABE (RYU). [**An Experiment on Lipovaccine of** *Bacillus dysenteriae* **Shiga.**]—*Gun-I-Kwai Kwaiho* (*Proc. of Navy Med. Corps*). 1921. Oct. No. 34. [Summarized in *Japan Med. World*. Tokyo. 1922. Mar. 15. Vol. 2. No. 3. p. 84.]

Lipovaccines were prepared with heated olive oil. No difference was noted between this preparation and heated saline bacillary emulsions in the production of opsonins, etc. Being less toxic to guinea-pigs, he considers it superior for human injection.

P. H. M-B.

THJÖTTA (TH.) & SUNDT (ODD FALSEN). **Toxins of** *Bact. dysenteriae*, **Group III.**—*Jl. Bact.* 1921. Sept. Vol. 6. No. 5. pp. 501–509.

*Bacillus dysenteriae* of Group III of SONNE [see this *Bulletin* Vol. 7, p. 222], a Flexner bacillus of peculiar characters, produces toxins allied to the toxic strains of *B. dysenteriae*. It is atoxic in a mild degree for rabbits and monkeys. It is the same organism as the type E of Kruse, 1907. Preliminary experiments on rabbits with a locally isolated strain of Shiga's bacillus showed that the technique was suitable for obtaining a good yield in exo- and endotoxin. Working with Group III they found an initial acid production in the medium followed by a period of alkalinity; the toxin production apparently does not begin until the alkaline period has set in. Broth in which the organism was cultured was filtered through a Berkefeld filter and the filtrate tested for sterility, and the toxin thus prepared injected into rabbits and white mice. The exotoxin injected intravenously produces distinct paresis of the extremities; no diarrhoea was observed and no deaths occurred.

The endotoxins were prepared by inoculating large agar flasks and emulsifying the 24-hour growth in normal saline. The emulsion is placed in the incubator for autolysis for two days, then filtered through Berkefeld candles, tested for sterility and injected into rabbits. The rabbits thus injected with endotoxins of dysentery bacillus Group III showed intestinal disturbances indicated by diarrhoea. In no case was there paresis.

Experiments on anti-toxin production showed a distinct protective action of the anti-endotoxin serum against its homologous toxin, while control tests with endotoxin and anti-exotoxin serum did not show protection. It seems justifiable to consider the toxic effect of the extract of dysentery bacilli as a specific action due to the endotoxins of the dysentery bacillus rather than to a non-specific protein toxicity.

The conclusion reached is that repeated injections of these toxins over a relatively short period of time render rabbits immune and their sera show a weak protective action against the homologous toxins.

P. H. M-B.

LISBONNE (M.) & CARRÈRE (L.). **Antagonisme microbien et lyse transmissible du bacille de Shiga.**—*C. R. Soc. Biol.* 1922. Mar. 18. Vol. 86. No. 11. pp. 569–570.

The authors have recently demonstrated the possibility of obtaining a bacteriophagic substance destructive to Shiga's bacillus by bringing a bouillon culture of Shiga's bacillus into contact with several drops of a leucocytic extract *in vitro*. The elaboration of this lytic principle

can hardly be explained by the intervention of D'HERELLE's intestinal bacteriophage. The following experiments are cited :—

A broth culture of Shiga's bacillus is inoculated with a trace of *Bacillus coli*. After a variable time in the incubator it is filtered through a Chamberland L.3. To 10 cc. of bouillon 20 drops of the filtrate are added and a fairly opalescent emulsion of Shiga's bacillus. After incubation this is again filtered, and so on, till at the third or fourth passage the total lysis of Shiga's bacillus can be observed. Furthermore, seven trials with five strains of *B. coli* isolated from urine and stools have been made on similar lines. The lysate in this case is active against three Shiga cultures. Substitution of Proteus $X_{19}$ for *B. coli* has given identically the same results. In light of these researches the authors consider themselves justified in suggesting that the presence of a Shigaphagic body in the stool is the result of microbic interaction analogous to that observed *in vitro*. Another theory which has supporters is that the bacteriophagic substance is a parasitic and ultramicroscopic parasite living in these various bacilli. This view, the authors think, is opposed to all accepted views upon the general biology of bacteria.

P. H. M-B.

JONESCO-MIHAESTI & POPESCO (C.). **L'influence de la concentration en ions H sur le développement et la production de toxines par le Bacille de Shiga.**—*C.R. Soc. Biol.* 1922. Apr. 29. Vol. 86. No. 15. pp. 893–895.

The concentration of hydrogen ions would appear to exert a considerable influence upon the production of toxins of micro-organisms in general. The authors set out to determine the optimum conditions for the development of Shiga's bacillus and also the concentration of hydrogen ions most favourable to toxin production by this bacillus. To the filtrate of a bouillon culture of Shiga's bacillus is added 3 gm. NaCl., 2 gm. phosphate of soda and 15 gm. of peptone to every 1,000 cc. This is boiled for 30 minutes and after filtration through filter paper the reaction is adjusted by addition of Hcl or NaOH in order to obtain the $P_H$ necessary; after further filtration it is sterilized for 5 minutes at 120° F. The limits of the ion concentration in which the development of Shiga's bacillus may take place lie between a $P_H = 5 \cdot 4$ in the acid zone and a $P_H = 9 \cdot 1$ in the alkaline zone. The optimum reaction for toxin production would appear to be $P_H = 7 \cdot 5$ during the first 24 hours of incubation.

P. H. M-B.

## MIXED AND UNCLASSED DYSENTERY.

HAUGHWOUT (Frank G.). **Observations on the Differential Diagnosis of the Dysenteries.**—*Jl. Philippine Islands Med. Assoc.* 1921. Mar.–Apr. Vol. 1. No. 2. pp. 53–58.

The microscopist is under obligation to render to the clinician a full and complete report of anything of importance he has noted in the stool specimen. A bare report of the parasitological or bacteriological findings is not sufficient. The finding of *Entamoeba histolytica* in a stool does not necessarily mean that the patient is suffering from amoebic dysentery, any more than does the failure to isolate *Bacillus dysenteriae* signify that he is not suffering from bacillary dysentery.

The inability to secure reliable bacteriological results, unless the specimen is secured immediately it is passed, may be due to the activities of D'HERELLE's bacteriophagic organism. Gross inspection of the entire stool passed by a dysenteric is not, in the author's judgment, a safe means of determining the etiology of a given dysentery.

P. H. M-B.

MACKIE (F. P.), with TRASLER (George). **Laboratory Records from Mesopotamia.**—*Indian Med. Gaz.* 1922. Mar. Vol. 57. No. 3. pp. 85–92.

With experience, it is possible to diagnose acute bacillary dysentery by naked eye inspection of the stool. The typical stool resembles scrapings of raw flesh floating in raw meat juice. The usual technique was employed and not infrequently a pure culture of dysentery bacilli without a single *B. coli* colony was obtained. Preliminary microscopic agglutination of selected colonies was invariably carried out. Under the most favourable conditions when the stools are despatched fresh to the laboratory, as they were at Amara, 60 per cent. of positive isolations can be obtained. The following table shows results obtained in 30 months from July, 1916, to December, 1918 :—

| Year. | Shiga. | Flexner. | Irregular Strains. | Total Positive. | Percentage of +. | Total Negative. | Percentage of Negatives. | Total Plated. | Total Non-amoebic Stools Received. |
|---|---|---|---|---|---|---|---|---|---|
| July, 1916, to March, 1917 .. .. | 61 | 46 | — | 107 | 37·1 | 183 | 62·9 | 288 | 543 |
| April, 1917, to March, 1918 .. .. | 50 | 49 | 22 | 121 | 40 | 177 | 60·0 | 298 | 440 |
| May, 1918, to December, 1919 [1918 ?] | 117 | 83 | 15 | 215 | 40·1 | 320 | 59·9 | 535 | 552 |
| Total .. .. | 228 | 178 | 37 | 443 | 39·0 | 680 | 61·0 | 1,121 | 1,535 |
| Percentage of total plated .. .. | 20·3 | 15·8 | 3·3 | — | — | — | — | — | — |
| Percentage of positives .. .. | 51·4 | 40·1 | 8·3 | | | | | | |

Out of 1,121 stools plated 443 (39 per cent.) were positive and 680 (60 per cent.) negative ; B. Shiga was present in 20·3 per cent., and B. Flexner in 15·8 per cent., whilst 3·3 per cent. were of undetermined nature. Another table is given showing the results of isolation from non-blood and mucus stools in Baghdad in 1918. Out of 364 specimens only 10·9 per cent. were found to yield specific bacteria, and, as might be supposed, Flexner infections were twice as numerous as Shiga. Figures obtained from Indian hospitals were small, but they tend to show that successful recovery of Shiga and Flexner strains in British cases were 32·6 per cent., whilst in Indian it was only 22·6 per cent. The chances in favour of recovering Flexner strains from unsatisfactory faecal specimens are greater than in Shiga

infections. A summary shows that of blood and mucus stools 47·6 per cent., of mucous and diarrhoeal stools 30·6, and of partly formed motions 18·6 per cent., were positive.

Classified according to duration of disease, during the first week 80 positives were obtained out of 157 cases = 50·9 per cent.

During second week 16 positives out of 44 cases = 36·3.
During third week 5 ,, ,, 18 ,, = 27·7.
During fourth week 29 ,, ,, 73 ,, = 39·7.

An analysis of irregular strains failed to show any hitherto unascertained points. An epidemic of fulminating bacillary dysentery in a refugee camp at Baquabah, near Baghdad, is described. In a series of 95 blood and mucus stools examined 20 per cent. were found to contain *E. histolytica* and 80 per cent. were certainly bacillary. One hundred and fourteen autopsies were performed in 14 days and the gut lesions were described as intensely necrotic. During the course of these investigations in the wards and post-mortem room they failed to isolate the dysentery bacillus from the blood during life, or from the gall-bladder, liver or mesenteric glands after death.

The epidemiological evidence in favour of the dissemination of dysentery by flies is regarded as very strong in most tropical countries, and in Mesopotamia it was almost conclusive.

With reference to "flagellate dysentery" the accumulated figures further tend to bear out the opinion that these parasites are harmless commensals and play no part whatever in the production of disease. One telling instance is quoted—that of a persistent diarrhoea with enormous numbers of *Lamblia intestinalis*; when, however, the stool was cultured it was found to contain cholera vibrios in large numbers.

P. H. M-B.

Garcia Martinez (Arturo). **Sindroma leucocitario disenterico.** - *Repert. de Med. y Cirug.* 1921. Aug. Vol. 12. No. 11 (No. 143). pp. 600–617.

The author starts by making some preliminary remarks of a general nature on the value of leucocytic estimations of the blood and alterations in the relative percentages of the constituent varieties. The remainder of the paper deals with the leucocytic pictures in amoebic and bacillary dysenteries and in diarrhoea associated with ankylostomes, ascaris and trichuris, which he designates "helminthic dysentery."

He states that in the amoebic variety there is a slight eosinophilia, the other elements being relatively normal or exhibiting a mononucleosis. In the bacillary and in helminthiasis there is a polymorphonucleosis, with, in the latter, an increase of eosinophiles.

In some of the cases cited he also examined the stools microscopically. So greatly does he rely on the blood examination that he allows it to replace the bacterial and bases his treatment upon his findings. There is no mention of any total counts being made. He records ten cases which he diagnosed and treated as amoebic dysentery, although in five of them no amoebae or cysts were detected; three are given in the second group, diagnosed as bacillary dysentery and treated with serum, and ten in the third treated with chenopodium or thymol.

Unfortunately the figures given do not bear out the hypotheses. Thus, in the first group the constituents are not "present in relatively

normal proportions, except for a slight eosinophilia." Of the examples given the neutrophiles vary between 33 and 75 per cent.; the eosinophiles between 0 and 8 per cent.; the lymphocytes between 20 and 60 per cent. Among the counts in the other two groups we find the following three :—

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. | Polymorph. | 81, | Eosinoph. | 1, | Lymphocyt. | 15, | Large Mono. | 1, | Transit. | 2. |
| B. | ,, | 80, | ,, | 2, | ,, | 12, | ,, | ,, | 4, | ,, | 2. |
| C. | ,, | 79, | ,, | 2, | ,, | 14, | ,, | ,, | 2, | ,, | 3. |

These are so closely similar that the differences are within the limits of personal error; nevertheless, A. was treated with antidysenteric serum (presumably because no ova were found), B. with oil of chenopodium, C. with thymol, and all three cleared up. The diagnosis would appear to have been based as much on instinct as on the differential leucocyte count.]

H. Harold Scott.

Piltz (G.). **Ueber die Stellung der Ruhr unter den Ernährungsstörungen im Kindesalter.** [Dysentery in Relation to Nutritional Disturbances in Children.]—*Jahrbuch d. Kinderheilk.* 1922. May. Vol. 98. 3rd Ser. Vol. 48. No. 3–4. pp. 153–175. With 1 chart in text.

Dysentery is commoner in sucklings and children than has frequently been believed. As a cause of mortality during the summer months it is now playing, in Germany, at any rate, an important and increasing rôle, and the spread of infection may be directly ascribed to the war. Formerly, too, a large number of cases of dysentery were mistaken for examples of other diseases. In 1911–12 dysenteric lesions were recorded as occuring in 15 out of 774 post-mortems on infants, or 1·9 per cent.; in the same period 1920–21, in a series of 821 cases, similar lesions were recorded in 3·2 per cent.

In the author's opinion, in the recognition of dysentery or dysentery-like diseases, bacteriological or serological investigations play a minor part as compared with the clinical picture and gross pathological appearances at autopsy. In only well-marked cases can a bacteriological diagnosis of any value be obtained. The infectious character of the disease is particularly important.

In many acute cases of dysentery the outstanding symptoms are brought about by nutritional disturbances consequent upon the infection. Involvement of the kidney and urinary passages is encountered in dysentery in the form of pyelocystitis and pyelonephritis and renders the prognosis exceedingly grave.

P. H. M-B.

Labbé (Marcel) & Bith (Henry). **Insuffisance hépatique aiguë et acidose au cours de la dysenterie.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. May 18. 38th Year. 3rd Ser. No. 16. pp. 760–764.

The authors give a clinical record of frequent dysenteriform attacks in an elderly lady. Death took place suddenly with symptoms of acidosis and hepatic insufficiency amply confirmed by frequent and exact urine analyses.

Stool cultures did not reveal any particular micro-organism as the cause of the enteritis, and at autopsy a grave parenchymatous degeneration of the liver was manifest. In the discussion other observers recorded their experience of a similar condition in choleraic forms of dysentery.

P. H. M-B.

LE ROY DES BARRES (Adrien). **L'appendicite dysenterique.**—*Rev. Méd. et Hyg. Trop.* 1922. Mar.–Apr. Vol. 14. No. 2. pp. 42–50.

The possibility of appendicular inflammation occurring in the course of a dysentery has been recognized for the last 20 years. Dysenteric appendicitis may occur in Shiga dysentery as well as in amoebiasis and bilharzial dysentery. The ulceration causing appendicular inflammation may be slight or extensive. Perforation does not usually result in abscess but in a general peritonitis. Appendicitis may occur :—

(*a*) Prior to the appearance of dysenteric symptoms.

(*b*) Simultaneously with other signs of dysentery.

(*c*) During the course of a dysentery, especially of a relapsing and chronic character.

P. H. M-B.

YOUMANS (L. E.) & YOUMANS (John B.). **A Disease Clinically resembling Epidemic Dysentery. Report of Outbreak in a Rural Community.**—*Jl. Amer. Med. Assoc.* 1922. June 10. Vol. 78. No. 23. pp. 1798–1801. With 1 chart in text.

An epidemic of acute dysentery occurred in a rural district in Wisconsin. There were 46 cases of a severe type with fever, mucoid and bloody stools, pain and tenesmus, and 120 cases of a milder type with no deaths, complications or sequelae. Water supply could be exculpated and the presence of an unusual number of flies during the summer was assumed to have a bearing upon the spread of infection.

In many ways it resembled true epidemic dysentery, especially in its wide range of age incidence ; it did not show, moreover, the usual sequelae of subacute or chronic dysentery. Examination of satisfactory stool specimens failed to yield *B. dysenteriae* or allied groups, and this failure is ascribed to the fact that specimens had to be forwarded a considerable distance for bacteriological examination.

P. H. M-B.

HAUSMANN (Theodor). **Die rigorose Abführbehandlung der Dysenterie, insbesondere durch medikamentös erzeugten osmotischen Transsudationsstrom in den Darm.** [Drastic Purgative Treatment of Dysentery, especially by Osmotic Transudation produced by Drugs.]—*Deut. Med. Woch.* 1922. May 12. Vol. 48. No. 19. pp. 628–631.

Hausmann, writing on his experiences in Moscow, does not believe that anyone, especially if rigorously treated from the commencement, should die of dysentery. He further distrusts the serum treatment of the disease as not founded on a scientific basis ; since 1904 he has not used this method. Up to that year he had adopted the treatment by opium and astringents. At that time the death-roll in his practice had been quite considerable, but since his conversion to the opposite

line of treatment (calomel, castor oil, and the saline purgatives) it has been negligible. With regard to special symptoms, he believes that atropine is of distinct use in relieving the pains and tenesmus. The rational treatment of dysentery should then be conducted on the following lines :—Complete evacuation of the contents of the large intestine by means of sodium sulphate. Astringents, especially opium, should be avoided. Adsorbents, bolus and charcoal are uncertain in their action. The course of the disease is shortened by institution of hunger days. In the acute stage medicinal enemata are useless.

P. H. M-B.

DE LAVERGNE (V.). **Localisations rectales de la symbiose fuso-spirillaire au cours de la dysenterie amibienne.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1922. Apr. 13. 3rd Ser. 38th Year. No. 13. pp. 620–624.

Spirochaetes are numerous in the stools of amoebic dysentery. De Lavergne reports finding them in 70 per cent. In four chronic cases examined by means of the sigmoidoscope ulcerations and other lesions of the mucosa were present. Microscopic preparations obtained from these ulcerations showed large numbers of spirochaetes and fusiform bacilli. It is thought that the presence of this organism in large numbers is responsible for the chronic intractable emetine-resistant cases of amoebic dysentery.

P. H. M-B.

DE LAVERGNE (V.). **Symbiose fuso-spirochétaire et dysenterie.**—*Paris Méd.* 1922. June 3. 11th Year. No. 22. pp. 467–471. With 1 fig.

As a result of prolonged clinical observation de Lavergne believes that a spirochaetal infection of the tissues takes place secondary to prolonged amoebic ulceration. It is a symbiosis between the fusiform bacillus and the spirochaete for which certain alterations in the mucosa of the intestinal tract are necessary. Normally these organisms are present in the saliva, but not until abnormal conditions in the digestive tract prevail do they obtain a footing in the large gut.

It is a remarkable fact that, notwithstanding careful search, intestinal spirochaetosis has never been reported in the course of, or secondary to, bacillary dysentery. Most frequently the spirochaetes are associated with *Entamoeba histolytica* ; in some cases with other parasites, such as Lamblia or Trichocephalus ; very seldom not in association with some or other pathogenic agent. In a series of chronic amoebic dysenteries infected during the war and systematically searched, intestinal spirochaetosis was found in 76 per cent.

To classify the intestinal spirochaetes on a morphological basis does not seem to be possible, on account of their polymorphism.

According to de Lavergne specimens containing spirochaetes and fusiform bacilli are best obtained in smears of false membrane detached from the intestinal wall through the sigmoidoscope. The cytology of this false membrane is peculiar ; it contains cellular accumulations of red cells, mononuclears and rarely polymorphonuclear cells, no eosinophils as commonly met with in pure amoebic lesions. Active amoebic lesions are most frequently found in the lower part of the large gut and it is just in these situations too that spirochaetes are

most abundant. De Lavergne is convinced that these organisms are secondarily implanted in the amoebic lesions and that they are responsible for the persistance of intestinal ulceration, and that the beneficent results of injection of salvarsan compounds in these cases may thus be explained.

P. H. M-B.

VAN NITSEN (R.) & BEQUAERT (M.). **A propos de l'entérite à spirochètes.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1921. Dec. Vol. 1. No. 3. pp. 305–307.

This paper consists of a report of a case with dysenteriform symptoms in which the *Spiroschaudinnia cugyrata* (Werner) is given as the cause. No amoebae or cysts were found in the stool and the serological reactions were negative both to Shiga and Flexner bacilli. The organisms were present in large numbers in the purulent discharges. They measured 2–11$\mu$ in length by 0·25$\mu$ in breadth. The number of spirals varied from 2–10.

P. H. M-B.

BAUJEAN. **Dysenterie balantidienne à "*Balantidium coli*" observée à Dakar.**—*Bull. Soc. Méd.-Chirurg. française de l'Ouest-Africain.* 1921. Apr. Vol. 3. No. 14. pp. 52–54.

Two cases of so-called "balantidial dysentery" were observed at Dakar. The first, a Senegalese tirailleur, was infected with taenia, ascaris, ankylostomes, trichocephalus, bilharzia, and finally *Balantidium coli*; the latter were present in considerable numbers and were very active. Treated for his various helminthic infestations, the patient improved gradually and at the end of two months his stools were normal in appearance and the balantidia had vanished; in this case these organisms appear to have played a secondary rôle.

The second case presented a totally different complexion. His illness could not be ascribed either to amoebiasis or bilharziasis; retrogression was rapid and death ensued.

The numerous diarrhoeic stools contained bloodstained mucus—microscopically they literally swarmed with balantidia. At autopsy (one hour after death) localized lesions were found in the large intestine, especially in the caecum, which was hypertrophied to double its normal thickness; ulcers were numerous and of all sizes. The mucous membrane was distorted and engorged; some lesions were superficial, others deep. In haematoxylin stained sections balantidia were demonstrable in numbers not only in the glandular ducts, but also in the interglandular tissue and in the submucosa.

P. H. M-B.

GRAZIADEI (Giorgio) & MARIO (Stanzani). **Osservazioni sopra un caso di dissenteria da "*Balantidium coli*."**—*Pathologica.* 1922. Aug. 1. Vol. 14. No. 329. pp. 464–465.

The patient, a peasant, 50 years of age, had suffered for six months from diarrhoea, slight abdominal pain and frequent tenesmus. The faeces contained numerous balantidia, a few giardia, some trichomonas, and also ova of ascaris, trichuris, and *Strongyloides stercoralis*.

Repeated examination failed to reveal any amoebae. The man was accustomed to eat raw salad grown on soil fertilized with manure from pigs which he kept. Inoculation of guinea-pigs and a cat per rectum with the faeces yielded no results.

Treatment consisted in regulating the diet and in injecting emetine intramuscularly in doses of 0·03 gm. (0·45 gr.) daily. The actions, which were 10-15 in number on admission, were rapidly reduced and in eight days the motions were formed and no balantidia were discovered in them. The worm ova continued to be excreted and for these the patient was treated with thymol.

H. Harold Scott.

Kolisch (R.). **Ein Fall von Balantidiasis coli.**—*Wien. Klin. Woch.* 1922. Mar. 16. Vol. 35. No. 11. pp. 246–247.

Records a case which occurred in the author's practice, but which presented no features of exceptional interest.

P. H. M-B.

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Bordoni Posse (César). **Zur Kenntnis der pathologischen-anatomischen Veränderungen bei gleichzeitigen Infektionen mit Ruhr- und Enteritis- (Paratyphus- oder Gärtner-) Bacillen.**—*Virchows Arch. f. Path. Anat. u. Physiol.* 1922. Mar. 28. Vol. 237. No. 3. pp. 380–399. With 4 text figs.

Cammaert (C. J.). **Ernstige dysenterie in Zeeuwsch-Vlaanderen.** [Correspondence.]—*Nederl. Tijdschr. v. Geneesk.* 1921. Nov. 19. Year 65. 2nd Half. No. 21. pp. 2593–2594.

Guimarães (Aristides). **Epidemia de dysenteria bacillar.**—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1921. Dec.–1922. Jan. Vol. 4. Ser. 2. Nos. 10–11. pp. 293–294.

Kramer (P. H.). **Bacillaire dysenterie in Zeeuwsch-Vlaanderen.** [Correspondence.]—*Nederl. Tijdschr. v. Geneesk.* 1921. Nov. 26. Year 65. 2nd Half. No. 22. p. 2735.

Kremer (W.). **Ernstige dysenterie in Zeeuwsch-Vlaanderen.** *Nederl. Tijdschr. v. Geneesk.* 1921. Nov. 5. Year 65. 2nd Half. No. 19. pp. 2300–2301.

Paranhos (Ulysses) & Reis (Paiva). **Formas atypicas da amibiase intestinal.**—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1921. July & Aug. Vol. 4. 2nd Ser. Nos. 5 & 6. pp. 123–126.

Pol (O. J. Hulshoff). **Dysenterie in Zeeuwsch-Vlaanderen.**—*Nederl. Tijdschr. v. Geneesk.* 1921. Dec. 10. Year 65. 2nd Half. No. 24. pp. 2909–2910.

## TROPICAL OPHTHALMOLOGY.

SICHEL (A. W. S.). **The Incidence of Conjunctivitis in Relation to Rainfall.**—*S. African Med. Rec.* Dec. 24. Vol. 19. No. 24. pp. 470–474. With 3 charts.

The author was engaged in the investigation of an epidemic of conjunctivitis occurring on Christmas Island. The climate in this locality shows a well-marked wet season, extending from January to May, and an equally distinct dry season from May to December, whereas the temperature is extraordinarily uniform. The mean annual temperature is 80·7° F., the extremes in the monthly averages throughout the years under observation showing a difference of only 2 degrees, while the diurnal range does not exceed 14 degrees. The industry of the island is the production of phosphate of lime. The phosphate quarries reflecting the sun cause an extreme glare, whilst the phosphatic dust is extremely irritating. Complete meteorological records for the past 14 years were in existence, and hospital records for the same period were available. It was thus possible to construct charts which show most strikingly the close relationship that exists between dry weather and the epidemics of conjunctivitis. The influence of glare and dust upon the causation of inflammations of the conjunctiva is clearly proved.

R. H. Elliot.

CUMSTON (Charles Greene). **A Brief Historical Summary of the Treatment of Trachoma, with Special Reference to the Arabian School and the Writings of Ali Ibn-el-Aïssa (Jesu Hali).**—*Proc. Roy. Soc. Med.* (Sect. History of Med.). 1921. Sept. Vol. 14. No. 11. pp. 43–51.

This very interesting paper does not lend itself to abstraction and should be read in the original. It is noteworthy that friction, massage, and the application of astringents (especially copper) were recognized from the days of Hippocrates onwards as valuable methods of treatment for trachoma.

The writer furnishes copious extracts from the *Tadkirat-el-Kakhaline*, a treatise written at Baghdad during the eleventh century by Ali Ibn-el-Aïssa.

R. H. E.

NICOLLE (Charles). **Etat de nos connaissances d'ordre expérimental sur le trachome.**—*Bull. Inst. Pasteur.* 1921. Dec. 30. Vol. 19. No. 24. pp. 881–894.

The writer prefaces his paper with the very true remark that we cannot say with certainty whether different, though allied, infections are not confounded under the name of trachoma. The paucity of animals susceptible to the disease is a cause of difficulty in experimental research. The chimpanzee, though suitable for the purpose, is difficult to obtain; the Algerian baboon (*Macacus innuus*) was, however, found by Nicolle and CUÉNOD to be a very satisfactory subject.

Inoculation in the baboon is followed by an incubation period of 10 days, during which time no reaction whatever is noticed; the

conjunctiva then becomes hyperaemic, oedematous and infiltrated, and about the 14th day a few small granulations appear along the upper margin of the superior tarsal plate. These granulations quickly assume a typical aspect and cover a large portion of the mucous membrane. The effect produced by the inoculation and the duration of the disease appear to vary according to the virulence of the material employed.

The virus was found to be active after passage through a Berkefeld filter No. V. It lost its virulence after having been for eight days on ice; preservation in glycerine was also found to affect it deleteriously.

Trachoma was found to be virulent and contagious during the whole course of the disease, and even the tears of trachomatous subjects were found to be infective. The smallest lesion of the conjunctiva may allow the infection to gain a footing.

Nicolle emphasizes the important part played by flies in the spread of the disease; fly destruction and segregation of trachomatous patients in fly-proof wards must therefore be regarded as two most essential steps in prophylaxis.

The author appears to be sceptical as to the existence in man or in the lower animals of any natural immunity to the disease. He is of opinion that the subconjunctival or subcutaneous injection of the products of curettage, obtained from the patient himself, is, at any rate, a useful adjuvant to the ordinary treatment of the disease.

Trachoma bodies, apparently identical with those described by PROWAZEK and HALBERSTAEDTER, were found in the early cases of experimental trachoma in the chimpanzee and in many of those amongst baboons and rabbits; they were not found, however, once the disease had reached a cicatricial stage. Nicolle is inclined to attach some significance to their presence in experimental trachoma, but finds it difficult to appraise their real importance.

R. H. E.

THACKER-NEVILLE (W. S.). **Treatment of Trachoma, a Translation from Therapeutique oculaire (Dr. Robert, 1920).**—*China Med. Jl.* 1921. Sept. Vol. 35. No. 5. pp. 474–477.

This paper describes the various remedies recommended by Dr. ROBERT for the treatment of trachoma. A rather novel method of therapeusis mentioned is the use of oxidized naphthol. The drug "is prepared by gently heating two parts of camphor and one of naphthol. It is then filtered. While filtering it do not expose it to the air (on filtre a l'abri de l'air), and one allows the naphthol and camphor to combine in a flask of white glass, until it has the consistence of syrup and is of a mahogany colour." The naphthol camphor is only used after it has been oxygenated for several days by exposure to the air and light.

It is highly important to protect the cornea during and after the application of the drug. This is effected by placing a fold of fine old linen cloth in the upper fornix after everting the lid. The lower fold protects the cornea, whilst the upper fold is used to dry the tarsal conjunctiva.

The application is followed by rather severe pain at first, but later applications have a rather sedative effect. The drug is used two or three times a week. It is claimed that the treatment produces very little scarring. It is advisable to use it in combination with silver nitrate in chronic cases.

R. H. E.

SOLOVIEF (Pierre). **Examen histologique de quelques pièces de trachome expérimental du lapin et du magot.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Dec. Vol. 1. No. 4. pp. 388–413. With 2 plates.

A very complete description is given of the histological changes found in experimental trachoma in the course of work at the Pasteur Institute at Tunis.

The tissues were fixed in Zenker's or in Schaudinn's fluid and stained with Giemsa, and haematoxylin and eosin.

The conclusions arrived at are that the experimental lesions are histologically identical with those of naturally acquired trachoma in the human subject, although the experimental disease runs a mild course free from complications. Prowazek's corpuscles are common in the early stages of both human and experimental trachoma; they are believed by Solovief to be derived from products which are the result of degeneration of the cell nucleus, and to have a real value in the diagnosis of trachoma.

R. H. E.

LUMBROSO (Ugo). **Observations relatives aux corpuscules de Prowazek et à leur signification dans le trachome, la blennorrhée et d'autres infections conjonctivales.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Dec. Vol. 1. No. 4. pp. 414–421.

Lumbroso's examination included 77 cases of various kinds of conjunctival inflammation and 10 in which the conjunctiva was normal. He found Prowazek's corpuscles present in nearly 63 per cent. of the patients suffering from trachoma in the early stage, but absent in the remaining 37 per cent. The corpuscles were found, on the other hand, in 100 per cent. of cases of non-gonorrhoeal blenorrhoea of the newly born. They were absent in all other varieties of conjunctival inflammation examined except in one case of gonorrhoeal ophthalmia neonatorum; the finding in this last case was doubtful.

Lumbroso advances the hypothesis that Prowazek's corpuscles represent an aetiological factor in a specific conjunctival infection which is very frequently associated with early trachoma, and that a mixed infection is present when they are found in a trachomatous patient. Non-gonorrhoeal ophthalmia neonatorum is quite likely to be the specific infection in question, since the corpuscles are not only present during all stages of this disease, but are particularly abundant in it.

R. H. E.

DU TOIT (J. S.). **Quinine Amaurosis.**—*S. African Med. Rec.* 1922. Jan. 14. Vol. 20. No. 1. pp. 8–10.

Du Toit reports an unusual case of quinine amblyopia. The patient, age 40, had been in the habit of taking prophylactic doses of quinine (5–10 gr.) off and on for about 18 years, and had been treated for malaria repeatedly with 20 gr. of quinine. At 6 p.m. one evening, having been attacked by malaria, he took 39 gr. of quinine hydrochloride in tablet form. A few hours later he was found to be deaf, and suffering from severe vomiting. Six hours after the drug was taken his pupils were dilated, but his sight remained good. On waking

two hours later he was unable to see the light in the room. The fundi presented the usual ischaemic appearance. The loss of hearing was very transitory. The total blindness remained for seven weeks, when the sight gradually began to return, and for two months he enjoyed fairly useful vision. Five months after he was first seen the sight again failed, and a month later total and permanent blindness had supervened. There was then a condition of advanced optic atrophy associated with very narrow retinal vessels; the arteries were specially affected and showed white lines along their walls.

Du Toit finds it difficult to explain the loss of sight on the second occasion. He suggests that it may have been due to the effect of alcohol and tobacco upon ganglion cells and nerve fibres already damaged by the quinine.

R. H. E.

ORMOND (Arthur W.). **Some Cases of Quinine Amblyopia and Notes on its Pathology.**—*Guy's Hosp. Reports.* 1921. Oct. Vol. 71. (Vol. 1. 4th Ser.) No. 4. pp. 461–471.

This paper records six cases of amblyopia following the administration of quinine for malaria acquired during military service. Four of these ended in loss of useful vision. Three symptomatic stages are noted: (1) the initial loss of sight; (2) a partial recovery; (3) a subsequent failure which may leave the patient diminished sight, or even none at all. After a lapse of one or two years the changes in the eye are almost stationary.

Ormond considers that the early ophthalmoscopic signs, resembling embolus of the central retinal arteries, are due to a spasm of the vessels, resulting in a partial coagulation-necrosis of the inner retinal layers. The spasm does not persist permanently, but relaxes, and the contracted appearance of the vessels is apparent only. The last stage, when permanent contraction is a reality, is consequent on the optic atrophy which is the final result of the condition. He most properly states that the existence of quinine amblyopia ought to be more widely known, now that heroic doses of the drug are being advocated in the treatment of malaria. The reviewer has persistently preached the latter doctrine for a number of years.

R. H. E.

WRIGHT (R. E.). *Rhinosporidium kinealyi* **of the Conjunctiva.**—*Indian Med. Gaz.* 1922. Mar. Vol. 57. No. 3. pp. 82–83.

After references to previous cases of the condition reported, and to the clinical appearances of the disease, an account is given of its occurrence in three Eurasian boys of the Madras Civil Orphan Asylum. The polypi, when they occur in the conjunctiva, become flattened out by the lid pressure, and their edges show a delicate fringe in which tiny yellow granules can be seen. In one case a polypus was bilobed and was suggestive of the lungs of a mouse.

Some points concerning the cases are noteworthy: (1) the presence of the growths was unsuspected by the boys and was only discovered in the course of a routine examination of the school made on account of an epidemic of conjunctivitis; (2) the boys had been residing in the institution for over six years, and only one of them had been on holidays outside Madras. None of them had been to the West Coast (the disease is specially prevalent in Malabar, Cochin and Travancore); (3) the three boys were much of an age; (4) the Institution is provided

with a large swimming bath, freely used by the whole school throughout the year. The water is easily contaminated by dust and is said to be changed "once in two or three weeks"; (5) none of the cases showed involvement of the lachrymal sac or nose; Wright states that the same remark applies to the cases previously reported; but in this he is mistaken, for KIRKPATRICK observed a small rhinosporidial polypus in the inferior meatus of the patient in whom he reported a similar infection of the lachrymal sac. The polypus occurred on the same side as the original infection and about four years later; (6) although the school contains 60 girls and 94 boys, who live under practically the same conditions except that they use different playgrounds, no cases occurred amongst the girls.

Wright suggests that the position of the growths points to dust or water transmission.

R. H. E.

WRIGHT (R. E.). *Rhinosporidium kinealyi* **of the Conjunctiva cured by Tartarated Antimony (Tartar Emetic), and Notes on a Case in which the Lachrymal Sac was affected by this Sporozoon.**—*Indian Med. Gaz.* 1922. Mar. Vol. 57. No. 3. pp. 81–82.

This represents an important note upon the treatment of an infection which is frequently very difficult to eradicate completely from the naso-pharynx. The conjunctival polypus measured 5 mm. by 5 mm. and was a flattened disc with a narrow pedicle. The treatment was at first confined to the instillation of quinine drops, from 1 per cent. to 2 per cent., three times a day. This was continued for about seven weeks with no apparent good effect, indeed the growth appeared to increase in size. A 2 per cent. aqueous solution of tartarated antimony drops was then substituted and the growth gradually got smaller and smaller. In a month it had decreased by a half, in two months it had almost gone, and in three months there was not a trace of it.

The other portion of the paper refers to a rhinosporidial infection of the lachrymal sac, being apparently the second of this nature to be placed on record. A Moplah had a red tense swelling of the size of a filbert in the region of the sac. A small sinus was present in its upper part from which thin purulent matter escaped. The lachrymal groove was expanded, but caries was absent. Large masses of rhinosporidial polypi sprang from the middle and inferior turbinals. The sac had a fibrous wall with polypoid projections from its inner surface; these completely filled its lumen.

R. H. E.

WRIGHT (R. E.). **Extirpation of the Lachrymal Sac.**—*Indian Med. Gaz.* 1922. Feb. Vol. 57. No. 2. pp. 52–54.

This paper contains a full description of the Madras operation for excision of the lachrymal sac. Wright takes particular care to avoid injury to the angular vein, so that the operation is usually bloodless.

Local anaesthesia is used (2 per cent. novocaine in 1 : 10,000 adrenalin, approximately). The swelling, caused by the injection, is dispersed by firm pressure, and the incision, commencing just above the internal tarsal ligament, is made through the skin and subcutaneous tissues. Care is taken to note the position of the vein and to avoid it when making the incision; the skin is kept on the stretch with the fingers

of the left hand. A Mellor's retractor is next inserted and a quadrilateral field is exposed across the upper third of which runs the white and prominent tarsal ligament, whilst the lower two-thirds are occupied by the oblique fibres of the orbicularis. The orbicularis fibres are separated by the back of the knife point, and the fascia, which covers the sac, appears in the gap. The fascia is next split with the knife point and the sac is exposed. The edge of an Elliot's dissector is inserted into the gap in the fascia, and, by moving the instrument up and down, the outer side of the sac is freed. The movement is continued posteriorly and downwards, and then the instrument is carried across the front of the sac and used to separate it on the inner side and below at the commencement of the nasal duct. The last step is the separation of the dome ; this is effected by a sweeping movement of the dissector, which is used in a similar fashion to an egg spoon when evacuating the contents of a boiled egg.

The internal tarsal ligament is as often cut as not. Wright contends that its division is attended by no bad results, an opinion which the reviewer does not share. When the sac has been completely lifted from its bed, the blades of the scissors are pushed down the canal and the nasal duct is divided as low as possible. The lining membrane of the duct is then inverted by a few strokes of a curette and is pushed down into the inferior meatus. Occlusion of the canaliculi, as advised by GREENWOOD, is effected by clamping them with Halstead's mosquito forceps before cutting them.

Wright concludes by drawing attention to two points of technique : (1) occlusion of the canaliculi, as practised by Dr. GREENWOOD ; (2) location of, and respect for, the angular vein.

Surgeons who are not accustomed to perform this small operation should remember that the crest of the lachrymal groove and the internal tarsal ligament constitute two landmarks, strict attention to which will render success easy and certain.

R. H. E.

KOPKE (Ayres). **Les troubles oculaires dans la maladie du sommeil.** *Bull. Soc. Path. Exot.* 1922. Feb. 8. Vol. 15. No. 2. pp. 139–146.

It is suggested in this paper that the lesions of the optic nerve, so commonly found after the injection of atoxyl for the treatment of sleeping sickness, should be attributed to the trypanosome infection rather than to the atoxyl, and that the drug merely liberates the endotoxins from the parasites in the neighbourhood of the nerves ; it is suggested that a local reaction is produced in this way and that the nerves suffer in consequence.

The author may be right or he may be wrong in his contention, but the fact remains that the use of atoxyl is dangerous to sight, since it is quite likely to induce an atrophy of the optic nerves.

R. H. E.

KIRKPATRICK (Henry). **The Etiology of Primary Cataract.** *Brit. Med. Jl.* 1922. Mar. 25. pp. 467–468.

This paper suggests that all forms of primary cataract may have a common constitutional cause. If the cause is only active for a limited period, the cataract is likely to be a non progressive one, *e.g.*, punctate,

lamellar cataract, etc.; if, on the other hand, the action is continuous, the result is the production of a progressive cataract (presenile or senile).

The different conditions which are recognized to be associated with primary cataract are enumerated, and most of these are found injuriously to affect the endocrines, or to be accompanied by disturbances of that system. It is remarked that the diet of Indians, amongst whom cataract is so common, frequently is not only deficient in essential food factors, but is also badly balanced; this condition reacts deleteriously upon the endocrine glands. More local causes, such as exposure to injurious heat and light rays and the existence of an uncorrected error of refraction, are likely to determine the formation of a cataract in the eye of a person who is predisposed to a degenerative change in his lens fibres by reason of a constitutional defect.

R. H. E.

SMITH (Henry). **The Earliest Stage of Senile Cataract.** *Lancet.* 1922. Feb. 4. pp. 223–224.

The difficulty of arriving at any conclusion regarding the cause of the disease is mentioned. The inhabitants of the North-West of India, in whom cataract is specially prevalent, are well nourished; the fact that they are wheat eaters constitutes the chief difference between them and other Indians among whom the incidence of the disease is less.

Failing distant vision is stated to be the earliest symptom of cataract, and good results are claimed from the subconjunctival injection of a 1 in 4,000 solution of cyanide of mercury when the vision has not fallen below 6–10.

R. H. E.

WRIGHT (R. E.). **Keratomalacia in Southern India.**—*Brit. Jl. Ophthalm.* 1922. Apr. Vol. 6. No. 4. pp. 164–175.

In this very interesting paper the literature of experimental and of human keratomalacia is first reviewed, and the type of the disease met with in Southern India described, and its causation and treatment fully discussed.

In the course of the investigation a group of patients were fed on a mixture of yolk of egg, fruit juice, butter and raw meat juice, in addition to their ordinary diet. A liberal allowance of fat-soluable A was thus ensured. A similar group were treated on the ordinary lines with cod liver oil and the usual mixture of chlorides of calcium, sodium and ammonium. Each of these groups showed an equal improvement, and the rapidity of recovery was no greater in one than in the other.

Wright concludes (1) that the disease is a complex generalized disorder in which the liver, thyroid and intestine play an important part, and (2) that it is practically always associated with deficiencies in the dietary of a general type. It does not appear to correspond to experimental keratomalacia or xerophthalmia, due to deprivation of fat-soluble A, nor does it respond in the same way to the administration of a diet rich in this food essential. The chief measures in the treatment are general care of the eyes and of the intestinal tract, and the administration of cod liver oil, liver, thyroid extracts and salts.

The deleterious effect of a deficiency of vitamins in combination with an excess of carbohydrates in the diet, as pointed out by McCarrison, should be borne in mind when considering the aetiology of this disease.

R. H. E.

Mironesco (Th.). **Paralysie périodique de l'oculo-moteur provoquée par les accès de fièvre récurrente.**—*Presse Méd.* 1922. Jan. 7. Vol. 30. No. 2. p. 17.

The case is related of a patient who suffered from a paralysis of his left oculomotor nerve during an attack of relapsing fever. The paralytic symptoms appeared during the first onset of the fever, disappeared during the intermission and reappeared during the relapse.

Mironesco suggests that the paralysis may be the result of a small haemorrhage in the oculomotor area, or of the presence of spirilla in the capillaries of the same area.

R. H. E.

Sergent (Edm. & Et.). **Quatrième campagne antiophtalmique en milieu indigène algérien (1920).** *Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Sept. Vol. 1. No. 3. p. 336.

The prophylactic measures against the seasonal epidemics of ophthalmia, previously carried out in 1914, 1917 and 1919, in Algeria, were continued in 1920 and were much appreciated by the population. A 1 per cent. solution of silver nitrate is instilled in all cases of conjunctival inflammation; inspections are carried out and the treatment is applied by the inspectors engaged on antimalarial duty. One hundred and thirty-seven cases were treated during July and August, 1920.

R. H. E.

Ganguly (S. K.). **A Case of Herpes Zoster Ophthalmicus.** *Indian Med. Gaz.* 1921. June. Vol. 56. No. 6. pp. 211–212. With 1 plate.

Harman (N. Bishop). **A Direct Record Scotometer for Investigating the Central Field of Vision.**—*Indian Med. Gaz.* 1921. Sept. Vol. 56. No. 9. pp. 335–336.

Sántos Fernández (J.). **Trachoma in the Tropics.**—*Gac. Méd. de Mexico.* 1921. Aug.–Dec. Vol. 1. 4th Ser. No. 7. 1st Half. p. 419. [Summarized in *Jl. Amer. Med. Assoc.* 1921. Sept. 10. Vol. 77. No. 11. p. 897.]

## REVIEWS AND NOTICES.

KREDIET (G. J.). **Over het voorkomen van Protozoëncysten en ontwikkelingsvormen van Coccidiën in den darm van mensch en enkele dieren.** [On the Occurrence of Protozoan Cysts and Developmental Stages of Coccidia in the Gut of Man and some Animals.]—Proefschrift, Leiden. 1921. 8vo. pp. x + 62. With 1 plate. (Boek en Steendrukkerij Johannes Jesse, Amsterdam.)

This is a dissertation, in Dutch, presented to the University of Leyden for the degree of Doctor of Medicine. It comprises four chapters, preceded by a short introduction and followed by a brief postscript. A folding plate (eight figures in half-tone, from good photographs) completes the work.

Chapter I contains a short summary of the literature dealing with the intestinal protozoa of man and domestic animals—considered chiefly from a standpoint which the author terms "epidemiological." This adjective seems hardly apposite, however, since the author's real object was evidently to make a comparative study of the intestinal protozoa of man and those of the commoner domestic animals, with a view to ascertaining any possible relations which might exist between them. This first chapter is well and clearly written, but contains nothing that needs to be specially noticed here. The author's own contributions to the subject are contained in the next two chapters, which form the greater part of the work—the final chapter being a short summary and discussion of his findings.

In Chapter II the author describes his methods and records the results of his protozoal census of the intestinal contents of human beings, rats, oxen, horses, pigs, sheep, rabbits, and guinea-pigs. He confined his attention chiefly to cysts. Human material was obtained from patients in the University Hospital at Leyden. The animal material consisted partly of fresh faeces passed *per anum* and partly of the intestinal contents of slaughtered beasts. It was obtained from the animal house belonging to the Laboratory of Comparative Pathology at Leyden, and from the town slaughter-yard. Rats (species not stated) were obtained (dead) from the local sanitary authorities.

The following table summarizes the results obtained from the examination of human beings. Altogether 100 persons were studied—men, women, and children—and the author ascertained by personal inquiry that none of them had ever been in any tropical or subtropical country. It is not stated whether any of them had ever been abroad, though it is noted (p. 2) that the majority had never been outside their native province (South Holland).

Total number examined = 100.

| Infected with | Men. | Women. | Children. |
|---|---|---|---|
| *Entamoeba histolytica* .. .. | 6 | 1 | 0 |
| "*E. tenuis*" .. .. .. | 7 | 1 | 1 |
| *E. coli* .. .. .. .. | 18 | 8 | 4 |
| *Endolimax nana* .. .. .. | 15 | 7 | 3 |
| *Iodamoeba bütschlii* .. .. | 10 | 2 | 1 |
| *Giardia intestinalis* .. .. | 7 | 5 | 3 |
| *Chilomastix mesnili* .. .. | 3 | 2 | 0 |
| Number examined .. .. | 60 | 28 | 12 |

"*Entamoeba tenuis*" is the name used by the author to denote those strains of *E. histolytica* which form small cysts—according to the interpretation of the reviewer and other English protozoologists. The original table is not given in the above form, and some of the names of the protozoa

have been altered by the reviewer. [The original contains eight pages of further details of these cases, with a long tabular summary (three pages)—far too detailed for reproduction here.]

The findings from the animal investigations are given somewhat fully, but may be briefly summed up as follows :—

1. RATS. Number examined = 20. *Entamoeba muris* found in 2, "Limax cysts" in 8, "*Lamblia intestinalis*" in 2, "other flagellates" in 4.

2. OXEN. Number examined = 50. "*Amoeba limax*" cysts found in all. Amoebic cysts "with 4 *limax* nuclei (? *Endolimax nana*)" found in 1, Coccidia in 35, "Cysts of a flagellate" in 3.

3. HORSES. Number examined = 20. "*Amoeba limax*" cysts found in 2, Coccidia (? *Eimeria zürni*) in 10, "Cysts of a flagellate" in 2.

4. PIGS. Number examined = 50. "*Amoeba limax*" and "4-nucleate limax-cysts (? *Endolimax nana*)" in 48, *Entamoeba* sp., with cysts, 12–18μ in diameter, in 2, *Lamblia* cysts in 2, "other flagellates" in 9, Coccidia (? *Eimeria jalina*) in 11.

5. SHEEP. Number examined = 25. "Cysts of *Amoeba limax* and 4-nucleate cysts like those of *Endolimax nana*" found in all. Cysts "very like those of *Lamblia intestinalis*" in 1, "other flagellate cysts" in 1. Coccidia (*Eimeria faurei*) in 2.

6. RABBITS. Number examined = 20. Cysts of "*Amoeba limax*" in 8, *Eimeria stiedae* in 16.

7. GUINEA-PIGS. Number examined = 20. "*Amoeba limax*" cysts found in 3.

The findings in pigs, and in sheep and oxen, are especially noteworthy. It is unfortunate that the author gives no real indication of what he means by the loose term "*Amoeba limax*," and neither describes properly nor figures the cysts of "*Endolimax nana*" found in pigs, sheep, and cattle, nor the *Entamoeba* found in the pig. A further account of all these is much to be desired.

Chapter III contains a fuller account and discussion of the coccidia found in ungulates. The unusually high percentages of infection with these parasites in all the animals examined are emphasized, the author noting that they may be partly accounted for, perhaps, by his technique (concentration method of BAYER—see this *Bulletin*, Vol. 19, p. 625). He specially notes, also, that the coccidia were all found in healthy full-grown animals. He provisionally identifies the oocysts found in oxen and horses as those of *Eimeria zürni*, those in sheep as *E. faurei*, and those in pigs as *E. jalina*. In his postscript he takes note of the recent work of DOUWES (*Trop. Vet. Bulletin*, Vol. 10, p. 103) and disputes the validity of the name *E. debliecki* introduced for the coccidium of the pig by this worker. Its proper name, he considers, is that which he himself employs. [The name "*E. jalina*" is probably invalid. KREDIET has not, unfortunately, traced it to its source, and he cites no authority for it—having merely copied it from NEVEU-LEMAIRE. According to BRUMPT (*in* CAUCHEMEZ (1921), *Bull. Soc. Path. Exot.*, xiv, p. 646) the "*Coccidium*" to which PERRONCITO originally gave the name "*jalinum*" was in reality a *Blastocystis*. See also NIESCHULZ (1922), *Centralbl. f. Bakt.*, I Abt. (Orig.), lxxxviii, p. 379.]

In his final chapter the author points out, *inter alia*, that he has found *E. histolytica* in no animal but man. He found, indeed, a species of *Entamoeba* in pigs, but its cysts were invariably uninucleate. [Probably *E. suis* Hartmann.] The "*Lamblia intestinalis*" found in rats, pigs, and sheep is apparently regarded by the author as identical with *Giardia intestinalis* of man; but while he is confident that species of *Endolimax* occur in rats, cattle, sheep, and pigs, he hesitates to identify any of these as yet with *E. nana*. [The reviewer notes as curious the alleged occurrence of "Iodine cysts" (= *Iodamoeba*) in no less than 13 per cent. of human cases, but their entire absence from pigs. The apparent absence of *Trichomonas* from rodents also seems to him remarkable.]

It may be added that the occurrence of eggs of various intestinal worms, in the animals examined, is incidentally recorded.

[This dissertation merits the careful attention of all workers engaged in the study of intestinal protozoa—an attention which, unfortunately, it is not likely to receive, owing to the manner of its publication. It is to be hoped that the author, who evinces unusual ability, will continue his work, and will ultimately publish it in greater detail in some readily accessible journal.]

Clifford Dobell.

BIJLSMA (U. G.). **Onderzoek naar het voorkomen van darmprotozoën bij Nederlanders.** [An Investigation into the Occurre ne of Intestinal Protozoa in Natives of Holland.]—Proefschrift. Amsterdam. 1919. 8vo. pp. x + 95. 4 plates. (Boek- en Kunstdrukkerij G. J. Willemse, Utrecht.)

This work is a dissertation submitted to the University of Amsterdam some three years ago for the M.D. degree. It contains information of much interest to those English workers, both at home and abroad, who have been engaged of late years in studying the occurrence and distribution of the intestinal protozoa of man.

The author—mainly inspired, apparently, by the observations of English protozoologists during the War—set out to make a careful survey of the intestinal protozoa occurring in the inhabitants of Holland. He intended originally (the investigations appear to have been begun in 1917) to ascertain what intestinal protozoa occur (1) in persons returning to Holland from the tropics, and (2) in natives of Holland who have never been in tropical countries ; but the carrying out of the first part of the programme was prevented by the War, and consequently he was forced to confine his attention to the second part. His material consisted of stools obtained from Dutch troops (belonging apparently to the Colonial Reserve, garrisoned at Nymegen), and from a few interned Belgian soldiers. Altogether he examined 200 cases—192 Dutch and 8 Belgian. None of these men had been in the tropics ; but it is not recorded whether any of them had been abroad, or in subtropical lands. At the time of writing the author was not acquainted, of course, with the final results of similar work done in England (see this *Bulletin*, Vol. 18, p. 33), though the earlier findings in this country were known to him ; and somewhat strangely he barely mentions the observations published in Holland by KUENEN some six months earlier (this *Bulletin*, Vol. 17, p. 3).

The dissertation contains five chapters, besides a brief Introduction ; the subjects dealt with in the chapters being, in order, " The intestinal protozoa found in man," " Material and methods," " Morphology and diagnosis of the human intestinal protozoa," " Results of the [author's own] investigations," and concluding " Reflexions." The first three chapters contain matter of a more or less introductory character, that dealing with the protozoa themselves (Chapter III) being, in many ways, the least satisfactory. In it the author describes and discusses various intestinal protozoa previously recorded—to the number of which he happily does not propose to add—and illustrates his remarks with three plates of 56 figures. This chapter contains numerous statements—taken, it is true, for the most part from the works of others—which are undoubtedly erroneous. A fair number of recent works on the subject are cited, but the references are not always correct, and many important papers have been overlooked. It is clear, moreover, that the author is not very familiar with the science of Protozoology, while on questions of nomenclature his knowledge and judgement are frequently at fault. As instances of such shortcomings the following—selected at random from many noted—may be given. On p. 9 (Chapter I) only five references are given at the foot, though no less than 17 works are referred to, by implication, in the text—without bibliographic indication ; and, moreover, of the five

references actually given, the first is downright wrong, and the second and third are incomplete (wanting year of publication and volume number respectively). On p. 27 it is stated that red corpuscles in the body of an *E. histolytica* can be recognized by their green hue—an assertion which is surely true for colour-blind people only. On p. 52 it is wrongly stated that the coccidia hitherto found in man belong to species which are proper to rabbits and oxen. On p. 45 the author objects to the name *Dientamoeba*, but naively remarks that he will leave the selection of " a better name " for this organism until its " biology " is better known ! Other passages which reveal a lack of acquaintance with the rules of nomenclature could also be quoted. But it is unnecessary to mention all the errors and inaccurate statements which can be detected in this chapter, though they are not to be ignored, since they show that the author is by no means an infallible authority on the subject of which he treats, and that his diagnosis, therefore, cannot always be accepted without reserve.

In Chapter IV the author's findings are given in detail. Briefly they were as follows :—

Number of cases examined = 200.

| Infected with | No. | Per cent. |
|---|---|---|
| *Entamoeba histolytica* .. .. .. .. | 22 | 11 |
| *E. coli* .. .. .. .. .. .. | 53 | 26·5 |
| " *E. tenuis* " .. .. .. .. .. | 34 | 17 |
| *Endolimax nana* .. .. .. .. .. | 16 | 8 |
| *Iodamoeba bütschlii* .. .. .. .. | 28 | 14 |
| *Giardia intestinalis* .. .. .. .. | 15 | 7·5 |
| *Chilomastix mesnili* .. .. .. .. | 7 | 3·5 |

No other protozoa were found by the author in his Dutch and Belgian cases ; but it may be noted that he also records a case of infection with *Dientamoeba fragilis* in a person who had formerly resided in the tropics. The very high rate of infection with *Iodamoeba*—recorded as " Iodine cysts "—is noteworthy, and raises a doubt as to whether the diagnosis was always correct in the case of this organism. " *E. tenuis* " is the amoeba regarded by English workers as a strain of *E. histolytica* which forms small cysts ; and consequently, if the diagnosis was not at fault, the total rate of infection with *E. histolytica* is—on this interpretation—no less than 28 per cent. The author attempts to justify the view that *E. tenuis* is a separate species, but his reasoning does not carry conviction. One of his plates shows a number of curves constructed from the dimensions of the cysts of *E. histolytica, E. coli,* and " *E. tenuis.*" They differ, however, from similar curves previously published (by the reviewer and others) chiefly because they are based for the most part upon numbers which are too small to give satisfactory statistical results (only 100 cysts were measured in most cases).

The figures given above, for the series of 200 cases, are based upon a variable number of examinations per case—some patients having been examined only once, but others twice, thrice, four times, or five times. Moreover, some cases were examined in the usual way, others after concentration of the cysts in their stools by two different methods (Cropper and Row, Bayer). It is thus impossible to form a close estimate of the true rate of infection with any of the organisms recorded. The results of the examinations are given in full, and occupy—together with other particulars of the cases—nearly 15 pages ; the total findings being then summarized in a table extending over 10 further pages. Much interesting information can be extracted from these sections.

In the final chapter the author discusses his findings and compares them with those of some other workers. He reaches the conclusion that the figures obtained for Dutch soldiers are probably also applicable to the general population of Holland, but that certain sections of the community—*i.e.*, those engaged in " dangerous " occupations (sailors, fishermen, bargees, miners, etc.)—are more subject to infection than those who pass their lives in hygienic surroundings. He has now proved, he says, that intestinal protozoa do occur in the inhabitants of Holland,

and that all kinds which occur commonly in the tropics occur likewise in a considerable proportion of the resident Dutch population. In this respect he believes the conditions in Holland to be similar to those which obtain in England, and he urges that, while *E. histolytica* should be included among the causes of disease in his native land—not merely in her tropical possessions—yet treatment, directed towards the eradication of infections, is necessary only when infection is accompanied by clinical symptoms of disease. In general, his conclusions are in agreement with those of English investigators.

This dissertation contains much other information of interest to workers on the subject with which it deals, though it has not hitherto received the attention which it merits from other workers (including the reviewer); but for this unfortunate circumstance would-be readers can hardly be blamed, since the method of publication has effectively rendered the work almost inaccessible to all save a favoured few of the author's fellow-countrymen.

Clifford Dobell.

**The Practice of Medicine in the Tropics.** Edited by BYAM & ARCHIBALD. Vol. II.

In the review of "The Practice of Medicine in the Tropics, Vol. 2," which appears in the July number of the *Bulletin*, the following remarks are made (p. 538):—"The parasite of malignant tertian malaria is placed in the genus *Laverania*. SCHAUDINN long ago pointed out that a difference in shape of the gametocyte was hardly sufficient ground for a generic distinction, and this is the opinion of the reviewer."

It has been suggested that this passage is likely to mislead.

In the chapter on the Parasites of Malaria, under Section V, Systematic Position and Affinities (page 1543), the position of the authors in regard to the parasite of malignant tertian is quite clearly stated. Recognizing that there may be differences of opinion in attaching specific or generic value to any particular distinguishing character or group of characters, they give a choice of alternatives, one or other of which they consider is called for in order to more sharply separate the malignant from the other two types. They give their reasons for the advisability of such separation under three headings, and "a difference in shape of the gametocyte" is not one of these.

In their choice of nomenclature the authors adopted the course followed in most recent works dealing with the malarial parasites (MANSON-BAHR, CASTELLANI & CHALMERS, ZIEMANN).

As a detail referring to a minor matter to which the reviewer alludes in another connexion, it may be pointed out that he substitutes the term "pore" for the words "opening or rupture" used by the authors.